DOCUMENT RESUME

ED 041 530 HE 001 379

TITLE	Teaching, Research, and the Faculty. The Study of Education at Stanford. Report to the University, VIII.
INSTITUTION	Stanford Univ., Calif.
PUB DATE	Nov 69
NOTE	147p.
EDRS PRICE	EDRS Price MF-$0.75 HC-$7.45
DESCRIPTORS	*Effective Teaching, Faculty Promotion, *Federal Government, *Higher Education, *Research, *Teaching Quality
IDENTIFIERS	*Stanford University

ABSTRACT

This is the 8th in a series of 10 reports on education at Stanford University. Short essays on the art of teaching written by 20 members of the faculty are followed by a discussion of the constraints frustrating the commitment to life-long learning expressed by faculty members. In addition to the possible dichotomy between teaching and research, teaching may also be hampered by pressure to teach outside the sphere of the professor's intellectual interests, by the need to publish, by demands made on the faculty member by industry and government, and by the complicating influence of tenure. Based on interviews with 100 faculty members, the Committee made 17 recommendations aimed at enhancing the role of teaching and increasing the usefulness of research to individuals as well as to society as a whole. The general problem of federal involvement in university research and the benefits and hazards arising therefrom are also discussed, and recommendations are made to mitigate some of the criticism against the university-government partnership. Two sections deal briefly with the question: is research kept in proper balance with the teaching function? (AF)

The Study of Education
at Stanford

Report to the
University

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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Teaching, Research,
& the Faculty

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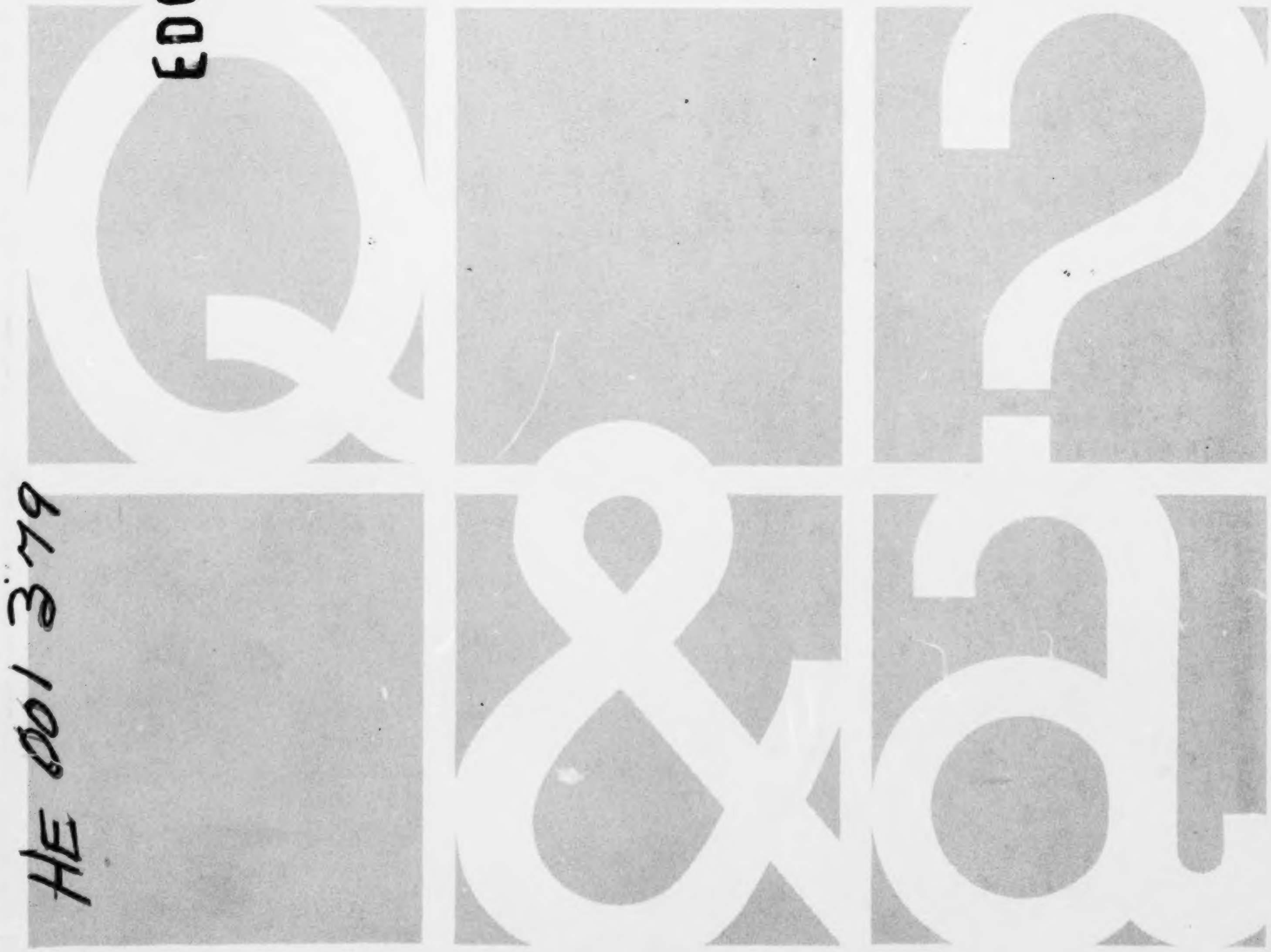

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Preface

This is one of a series of reports, which we submit to the University community for its consideration. The first of our reports, *The Study and Its Purposes*, stated the general premises on which our recommendations turn. The remainder of this series consists of the following:

II. *Undergraduate Education*
III. *University Residences and Campus Life*
IV. *Undergraduate Admissions and Financial Aid*
V. *Advising and Counseling*
VI. *The Extracurriculum*
VII. *Graduate Education*
VIII. *Teaching, Research, and the Faculty*
IX. *Study Abroad*
X. *Government of the University*

Comments on these reports, and requests for copies, should be addressed in writing to Study of Education at Stanford, Room 2A, Building 1, Stanford University, Stanford, California 94305.

November 1969

Steering Committee
The Study of Education at Stanford

Steering Committee
The Study of Education at Stanford

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Introduction

Report
of the
Steering Committee

In the first of these reports, entitled *The Study and Its Purposes*, we tried to state the philosophy upon which recommendations in our subsequent reports would be based. Not surprisingly, we found it necessary to begin by stating our definition of education "... a continuous process of discovery, beginning with a man's first day and ending only when his mind closes in on itself and can find or conceive nothing new." From this definition we developed the position that the true educational process is lifelong and must be the concern of the person himself, self-willed and in large measure self-directed.

The faculty of a university consists of persons who have made a deep, professional commitment to this position. They are attracted to the university because it is the primary institution for the creation of new knowledge and the transmission of existing knowledge. It is here that they both find and help to sustain an environment in which they can follow their own commitments to scholarship and at the same time initiate students into the world of self-motivated learning. However, they operate within a system of pressures and constraints that tends to frustrate their attempts to follow their basic commitment. They therefore present an imperfect model of the self-motivated teacher-scholar to their students and colleagues.

At the moment, pressures that produce unfavorable conditions for both the teaching and research activities of the faculty can be identified. For example, the outcome of the recent debate about classified research, while it may accurately reflect the changing views of the faculty as a whole, nonetheless produces an unfavorable environment for those faculty members whose research interests coincide with matters of national security. There is also the larger question of how to broaden the areas of federal research support and to develop interests among government agencies that are compatible with the university's objectives. We believe this is a matter of great urgency, but we have no detailed proposals to offer. However, we strongly feel that the pressures that lead to ineffective teaching, including excessive emphasis on research, are at least as injurious to the health of the university as those that constrain research and are certainly of much longer standing. Accordingly most of the analysis and recommendations that we present in this report represent an effort to define and encourage effective teaching.

To make any progress at all in this direction we found it necessary to come to some more or less specific agreements about what constitutes "good teaching." We were aided immeasurably in this effort by essays on the art of teaching, which were solicited from representative members of the faculty. Because our recommendations are based on the concept of teaching and the teacher that is developed in these essays, we include them first in our report, immediately following an introduction that was written by Professor Packer of the Steering Committee. We recommend a careful reading and reflection on their contents by every member of the University community.

Against the background of these essays we present recommendations that we believe will help to resolve conflicts between the teaching, research, and administrative activities of the faculty. In developing these recommendations we have been guided by the report of the SES Topic Committee on Research Policy. The Topic Committee, chaired by Professor Gerald Lieberman, divided itself into three subcommittees: 1) Government and Research, 2) Goals and Decision-making Processes, and 3) Teaching and Research.

The members of the Subcommittee on Government and Research were:

William K. Estes, *Chairman*, Professor of Psychology
Richard A. Brody, Associate Professor of Political Science
Earl G. L. Cilley, Research Administrator
Robert Hofstadter, Professor of Physics
Gerald J. Lieberman, *ex officio*, Professor of Statistics
Judith S. Lieberman, Graduate student in Operations Research
William R. Rambo, Professor of Electrical Engineering

The members of the Subcommittee on Goals and Decision-making Processes were:

Marvin Chodorow, *Chairman*, Executive Head and Professor of Applied Physics, Professor of Electrical Engineering
Randall K. Fields, Graduate student in Political Science
James C. Kimberly, Assistant Professor of Sociology
Sidney Liebes, Jr., Research Associate in Genetics
Alan S. Manne, Professor of Economics and Operations Research
Julius Margolis, Professor of Economics

The members of the Subcommittee on Teaching and Research were:

Menahem M. Schiffer, *Chairman*, Professor of Mathematics
Nathaniel L. Gage, *Acting Chairman, Spring 1969*, Professor of Education and Psychology
Marsden S. Blois, Jr., Associate Professor of Dermatology
David E. Harrison, Graduate student in Chemistry
Robert M. Rosenzweig, Associate Provost

We are grateful to all of them for this contribution to the Study of Education at Stanford. The reports of the subcommittees, which were read and discussed by the full committee, follow the summary of our recommendations.

Some Prefatory Observations

Herbert L. Packer

It is a pleasure to respond to my Steering Committee colleagues' suggestion that I write a few lines to introduce this collection of essays on teaching by members of the Stanford faculty. The decision to use this symposium form rather than simply for the Committee to make some concerted noises about teaching seems, both in conception and in result, to have been extremely wise. The essays collected here represent, I believe, if not the ideal at least a good representative sample of statements about the art of teaching by a group of those who at this University engage in the art. I commend them not only to students but, in particular, to all junior members of the faculty.

First, a word about arrangement. The essays are printed here, for lack of any better ordering principle, alphabetically by author. In this brief introduction, I shall note several themes which seem to underlie many if not most of the essays.

Gerald Meier (GSB) has caught and summed up many of the ideas about teaching reflected in SES Report I, *The Study and its Purposes*. I particularly like his formulation:

> Although the best teacher is a catalyst for the student's discovery, he teaches in such a way that the student can learn to do without him.

His views on what I refer to as "the tyranny of the course" are well worth attention.

The teacher's openness is beautifully illustrated by Edwin Good's (Religion and Hebrew) statement:

> Yet the highest compliment a professor can pay to a student is this: 'He showed me something about my subject that I never knew before.' And that is to say that the best student is the one who functions as a teacher.

Similarly, there is a world of truth in Donald Fanger's (Slavic) epigram:

> The most successful teaching, in short, is seen in a course whose basic inadequacies become only gradually evident to the students, whose very virtues come gradually to seem limitations.

Each of the preceding writers and many of those who follow emphasize the integral relationship of a man's teaching to his research. Norman Wessells (Biology) deals superbly with this theme. Students will profit from his insights on this subject. The relationship between the two is, as he says: "what distinguishes the true university teacher from a college teacher." This theme is well echoed by Leonard Schiff (Physics), who goes on to develop three characteristics–avoidance of sarcasm, willingness of the teacher to display his ignorance, tailoring his presentation to the needs and abilities of his class–that all will, I think, agree are essential to a good classroom teacher.

James Gibbs (Anthropology) emphasizes, and it can't be emphasized enough, the institution's approach to teaching, and his question is certainly very much to the point: "Do we have the skill to persuade our administrators to count all of this teaching [counseling, advising, and informal discussion] in setting expectations for faculty performance?"

We are greatly indebted to two senior members of the faculty, Hugh Skilling (Electrical Engineering) and Konrad Krauskopf (Geology) for setting teaching in its proper context, as one of rather than *the* central preoccupation of students during this developmental stage. It takes, I think, that "ripeness [which] is all" properly to perceive this point.

The personal and indeed the autobiographical note comes through with force in many of these essays. Daniel Mendelowitz (Art) speaks with warmth and affection about teachers who have meant much to him. Michael Arbib (Electrical Engineering) talks not only about the problems that teachers have but lets down his hair about his own "mistakes" as a teacher.

Before going on to speak of those who have illuminated the teaching of their own fields, I would like to mention one of the few who have emphasized the institutional problem, how does the university go about selecting its faculty. John Mothershead puts proper emphasis I think, on the evaluation process. He is surely right when he says:

> By 'taking teaching ability seriously' I mean simply don't hire or retain faculty members *as undergraduate teachers* who are not good at it.

No one could speak or I think has spoken more eloquently about the process of teaching his subject than two members of the English Department who have each written about the teaching of creative writing, Richard Scowcroft and Wallace Stegner. As Scowcroft says:

> No one more than the writing teacher has the obligation–and the difficulty– of helping a student to find and be himself.

I accede to the irresistible impulse to quote from Stegner:

> One listens patiently to things that by any standard are trivial, inane, compulsive, pretentious, obscene, or utterly mad, and one does so for only one reason: that out of the outlaw exuberance and rebellion of young writers comes every new insight, every slight change, that keeps literature alive and in touch with the changing surface of experience.

Three mathematicians have contributed excellent essays. From the, if I may say so, revered and venerable George Polya, we have his twelve aphorisms which quite transcend the teaching of mathematics. Harold Bacon and Mary Sunseri each has much to say about the teaching of mathematics.

Ex parte Clio Gordon Craig reports on the historian and his job. Albert Elsen enters a spirited defense of the lecture method for teaching art history. Holt Ashley provides what I might call a beautifully engineered comment on what the engineering student can expect from that field. Finally, George Spindler conveys to the intending student a splendid statement on the teaching of anthropology.

The emphasis, in these essays, on the interrelationship of teaching and research, and on the importance of an attitude of openness and "looseness" on the teacher's part, provides additional support for SES's basic stance on the importance of seeing to it that teachers have the freedom to teach what they want to teach and to work on the problems that interest them. The university is still a long way from achieving these intertwined goals; these essays in their central thrust point clearly the road to progress.

So Much to Teach and So Little Time. Moral: Teach Students to Teach Themselves.

Michael A. Arbib
Electrical Engineering

Let me start by saying that I am aware that I am not a perfect teacher, and let me point out what I know to be my main defects, in the hope that others may learn by my mistakes. I have a very mathematical mind, and so in those of my courses—such as Automata Theory—in which the content is essentially mathematical, I tend to prove a theorem and expect that to convey complete information to my students—many of whom operate on a more concrete level, wishing to work things through with examples. I would thus suggest that anyone who gives a mathematical course should continually bounce back and forth between the abstract level of theory and the specific level of examples. I feel that it has been of advantage to me to be able to think at a highly abstract and general level, and would therefore like my students to learn something of this type of thought, and be able to use it—and it would be useful to show them how to build up from specific examples to a general understanding, which has far more applicability than their original intuition. It seems to me that this is the essence of the mathematical method. It allows one to take one's intuition, express it in terms of some crisp formulae, and then, afterwards, to go back and notice that these formulae have a huge range of application, far transcending that which was thought to be the case during the original derivation.

My other main problem is that I go too fast for most of my students. This is all very well in a course in which one has bright students and an excellent textbook or set of lecture notes available. It does not work when you have, as is typical, students with very different backgrounds, and you are trying—as is so common in a graduate course—to push into areas where the only charts are your own research papers, and those of your colleagues—some of which have not yet even been published. The more I think about it, the more I think that it is almost criminal that this University has made so little use of teaching aids. I feel that it should be almost mandatory for there to be adequate secretarial services to generate decent lecture notes to supplement the available publications, as a matter of course. I also feel that the School of Education should make much more effort in trying to feed back to members of the faculty some real information about different teaching techniques. The current questionnaires—such as that of Tau Beta Pi—are quite inadequate to the task, because they do not really generate useful techniques, but simply allow one to measure the spectrum of student reactions. When one student tells me that I rely too much on lecture notes, whereas another one praises me for my use of lecture notes; or one student decries my constant punning, whereas another student admires the sparkling humour of my lectures (!), it is hard to know quite what action to take. Rather than some definitive prescription, then, one wishes to be exposed to a spectrum of methods which people have found useful, together with some sort of diagnostic as to when they work. Who knows, perhaps these essays may actually prove useful to teachers in deciding what to do.

One thing that I think is very useful is to have a set of lecture notes which go into great detail–and then not to lecture from them per se in the lectures, but rather to use the lecture to develop examples, to set out the "flow diagram" for the notes, showing what the essential ideas are, and then to focus in upon the particularly subtle arguments. In this way, the student, in his own time, can go over all the details and fit them into place–whereas the professor can concentrate upon the framework. In a mathematical development, a useful device is that of giving out to students the essential "lemmas" and then asking them to resynthesize the complete arguments in place. This gives them practice in going from their intuitive to a formal development.

Most of what I have said so far applies specifically to the rather mathematical course. But I have also been teaching a course called "Brains, Machines, and Mathematics" in which I try to use various metaphors drawn from computer science, but also from psychology and neurophysiology, to help the student understand the better his own mental processes, and also to see in which ways mathematical or engineering know-how can be used to augment psychology. I have not found that this sort of course lends itself to the usual type of examination technique, and so would like to draw to the attention of readers the following idea. What I do is give the students some lecture notes together with a fairly full bibliography. I then ask them in the first two weeks of the course to read through these notes quickly and decide which of the areas they wish to write a paper on. They are then given four weeks to go off and read some specified number of papers and write a short one-page or so report on each. The interesting thing here is that I insist that at least half of the papers they read be ones that I have not indicated in the bibliography. They are told that browsing through certain standard journals is one way to find papers, but they are also told how to use Citation Index to refer forward in the literature and how to use the reference list in papers to go backwards in the literature. After this report on reading has been looked over, they are then asked to prepare a proposal for a term paper which will knit together the theme developed within a number of those papers. Specifically, they are asked to show how experimental results led to the formulation of theory and how the theoretical developments in turn can lead back to the conduct of new experiments. At this stage they are asked to come into my office and discuss with me for 15 minutes or more their view of the paper they are embarking upon. I find that this personal interaction makes an immense difference in the structure, and usefulness, of the final paper. Then in the last few weeks of the quarter they put all these things together and come up with a paper, which, even if only reporting results available in the literature, does have some of the flavor of conducting a research project.

May I turn now to another pet peeve: the small extent to which students make use of the office hours of professors. Students miss many valuable opportunities to play a greater role in the evolution of the course, and in the pacing of the material. In particular, one of the worst syndromes of students is the belief that if they are having trouble with the material, they are the only person in the class to do so. As a result, weeks may go by in which certain fundamental concepts are misunderstood, and yet no student comes forward to tell the professor. I confess that perhaps more skill in diagnostic homework would make it unnecessary for students to actually communicate with their professor, but I am not clear that avoidance of personal contact is to be encouraged.

Finally, I feel that there should be much more in the way of professors teaching students for a one-year sequence, rather than taking them in separate one-quarter courses. I feel that the intensity of intellectual interaction can be magnified immensely in this fashion, to the benefit of all.

Some Thoughts on the Interaction between Teaching & Other Professional Activity in Engineering

Holt Ashley
Aeronautics and Astronautics

This discussion must begin—apparently in a rather negative way—by describing 1) some misapprehensions which are held by most young engineering students and 2) some not-unrelated deformities in the curricula of most of our first-line departments of engineering. On the one hand, their high-school experience provides entering freshman with almost no understanding of many dimensions involved in the practicing engineer's work. Introductory mathematics and science are presented fairly well at the secondary level. Moreover, engineers-to-be are frequently attracted to mechanical or electronic hobbies, such as automobile maintenance or amateur radio. But it is rare when their teachers encourage them to build a bridge of applied science from their course material to such a hobby. Also the "new" secondary curricula in mathematics, physics, chemistry, etc. tend to emphasize the purer fundamentals of these subjects at the expense of engineering-related applications. One ray on the horizon, which may ultimately work to restore some balance, is the introduction of high-speed computation in the schools; this technology is far better suited to the big but "routine" problems than to examining various number systems or Boolean algebra.

Having thus been reinforced in his perception of pure science as the higher intellectual discipline, the student enters a university. In his first physics and mathematics there, and all too often in his fundamental engineering science as well, he encounters advanced graduate students or dedicated teachers with a preference for basic laboratory research or for theoretical-computational structures built on highly idealized models of the physical world. These are intelligent individuals who populate engineering faculties because these departments feed on their own graduates. Generation after generation of excellent applied scientists earn their doctorates, perform research, publish, retire with minimal exposure to any but the fundamental and quantitative dimensions of the field they profess.

It is little wonder that thoughtful engineers in industry, commercial laboratories, and government repeatedly criticize the omissions that they sense in both the attitudinal and material preparation of the young people they hire from the acknowledged best schools. It is also no surprise that many students with a practical bent feel discouraged, wondering at what stage of the undergraduate or graduate curriculum they will begin to see *significant* applications of those Byzantine fundamentals which teachers assure them they must thoroughly comprehend before they can proceed to creative practice in their chosen specialties.

These disordered priorities do not have to exist. A quarter century ago the balance was much better, both because the size of the required body of engineering science did not overflow the hours available and because many more teachers were still on the job who enjoyed substantial funds of practical experience. More important, a new breed of engineering professors is emerging—fortunately, at more universities every year—who seem to have the key to a solution in the vastly more bewildering environment of the 1970s. The intention here is to examine some of the characteristics of these men and (yes, a few) women.

A universal property of the modern teacher of design, applied engineering—or whatever it is to be called—is that he is overcommitted. Nearly always he is well enough grounded in the fundamentals, the advanced theory, the precise experimentation to hold his own with more scientifically minded colleagues. He has personal or group research projects under way, if for no other reason than because that is how his laboratory and advanced graduate students are supported. But his greatest love is likely to be in the middle ground between research products and the needs of those who really practice his profession. Therefore he will be found working closely with engineering development organizations, on government advisory boards, and at all sorts of conferences dedicated to the exchange of engineering information. While he is remote from a stereotypic inhabitant of the groves of academe, his energy and commitment furnish his students with a vastly better image of the successful engineer in the world they are about to enter.

This man's life is full of conflicting schedules, of the necessity to be three places at once. But if he is really devoted to his primary responsibility as an educator—and the number of examplars is surprising—he somehow finds the time to meet nearly every class and to work individually with both the students in difficulty and the advanced-degree candidates who really need his help. He is often a splendid lecturer, not so much in consequence of skillful technique he has developed but because he is bubbling over with live examples and experiences to illustrate the material he covers. His class meetings abound with pictures, models, and other visual aids. He invokes a vast and disorderly series of reference material, but it is material with a currency possessed by no textbook whose ink is fully dry. His homework assignments are "open-ended," frequently not calling for a precise logical sequence to a unique answer which can be boxed and forgotten. Indeed he can be a great trial to students who have mistaken engineering for science and been reinforced in this misimpression by some of his faculty colleagues. Perhaps his most valuable quality is to open the eyes of those students who *do* respond to how their profession can most constructively be practiced. Even if he has no time to show them step-by-step how to design a reinforced-concrete shell, a giant radar, or a supersonic transport, he creates a state of open mind, which will later permit them to do such things and derive great enjoyment from the process.

An *obiter dictum* may be in order about what constitutes "good teaching." The keys are consideration for the student, the willingness and ability to see it from the student's viewpoint, application of the Golden Rule. The thoughtful lecturer needs no formal course in education to tell him that he should write large and clear on the blackboard, then get out of the way so his class can see and copy if they wish. He tries to pace himself to the absorption rate of the students who are somewhat slower than average. The interchange of question and comment, which he actively stimulates, can serve to buy time for the slowest. His assignments are clear and reasonable in their demands, although he may well try to "subvert" his better students, by capturing their enthusiasm, to devote somewhat more than scheduled hours to his subject. He organizes his material as well as it permits but never succumbs to importuning for a "canned, prepackaged" course that guarantees obsolescence through ossification. Some education is better accomplished by a teaching machine or through sessions in the library or the teaching laboratory. Recognizing the value in these products of technology, the good teacher does not compete with them but complements them in an enthusiastic, subjective spirit that no machine or book can simulate.

It is worth noting that many of the properties described above will come quite naturally to the engineering professor who interacts with his professional world. Effective communication is an absolute essential to the functioning of this world. The technical "briefer" operates as a teacher at the most demanding level of his activity spectrum.

One final word is necessary to put this discussion in perspective. The objectives, the responsibilities, and the historical nature of engineering in the university are such that a strong complement of engineering scientists must be present on every first-rate faculty. The principal intent of what has been said here is not to discount their importance or to disparage their way of life. Rather it is to call attention to the imbalance created by a dearth of other points of view in such faculties and to suggest how it might be righted. Great teachers of applied engineering and design will *always* be in short supply—the competiton with industry for their services is too unequal. By this very token they must be sought energetically, even borrowed for limited periods when more permanent relationships are impossible. They must be cultivated with the same care as Nobel physicists and even sheltered from the misunderstandings of their colleagues. There are, however, enough instances to constitute a "theorem" for their existence—a promise that the "impedance match" between the teachers and the practitioners of engineering may soon measurably improve.

Some Observations on Teaching Mathematics

Harold M. Bacon
Mathematics

It is not easy to answer the question, "*How* do you teach?" I suppose that I, like most teachers, use many devices and plans to enlist the attention and the interest of our students, but I am persuaded that much of what I employ as teaching methods is quite unconsciously done and more or less unpremeditated. I hope that the interest and involvement of the student result largely from the intrinsic attractiveness of the subject and from the student's conviction of its importance to him—perhaps all enhanced by the attitude and behavior of the instructor. "Teaching" should largely be a process of helping and encouraging the student to learn for himself, and I believe the effective instructor will always have this in mind.

As I think of some of the things I believe to be important in the process of teaching my subject, mathematics, I tend to have mainly in mind my experience of some thirty-eight years of working with freshmen and sophomores in the analytic geometry and calculus courses here at Stanford. Although I have had classes in many other courses in mathematics with a wide variety of students, this experience with the calculus courses has been the longest continuous one. In this, as in any other subject, the first essential is, obviously, that the instructor must be intimately acquainted with his subject. He must plan (or help to plan) the whole year's course, and he must prepare carefully for each day's class. No matter how many times in past years I have discussed a certain topic, I should never want to walk into the class where I am to take it up without having thought over carefully what I hope to do with the subject. If, for example, I am going to use an illustrative problem, I want to have worked it out carefully ahead of time to be sure to note any pitfalls that may be present, to think of connections with previous (or future) work in that particular class which the illustration might have, to anticipate questions that may be asked—not to provide answers to unasked questions but to be ready to answer questions I hope will be asked. I may even have to contrive to get an important question asked, and if all else fails, ask it myself. I must also convince myself that it is worthwhile to carry through all of the steps (or at least most of them) in the presentation of some theoretical material or in the solution of some particular problem. It is too often a temptation for the instructor to believe the statement, usually in the textbook, that "it is easy to see that" such-and-such follows from so-and-so. What is "easy to see" for the author or the instructor is often anything but easy for the student.

To teach a subject well, one really has to enjoy the subject himself. Part of the basis for the effectiveness of any teacher is his enthusiasm for the subject he is teaching. It is hard to believe that a teacher who dislikes the subject he is supposed to be teaching can inspire much genuine interest in that subject however clever an actor he may be. This is one reason why it is important to make it possible for a man to have a chance to teach the subject he likes best; there he will do his most effective teaching. If he likes his subject, he will find something new each time he teaches it. I think I have found some new ways of looking at even elementary calculus in each of the many years I've been through quite similar subject matter. True, one must consciously try to look at things afresh, but a student's question or suggestion, a colleague's proposal to use another textbook, even growing antipathy to a textbook adopted by a committee or a reorganization of the course to better meet the needs of students in another department, encourage a new look at an old subject.

Most important of all to me, in teaching an elementary subject such as calculus in which it is pretty clear that no great new fundamental advances are likely to be made in the subject itself, is that I like the students. I find real satisfaction in believing that I am helping them to do something they want and need to do. I hope to know most of them, even in a large class, well enough to estimate how well any particular individual is grasping the ideas I am trying to talk about (and trying to get students to talk about). In such a classical subject as first-year calculus, one cannot expect satisfaction from doing research of fundamental importance, although this is not totally impossible; he will take his satisfaction from the progress of his students. He wants to understand their goals, ambitions, frustrations with the subject. He needs to know that for some–probably many–the subject is not easy and that a great deal of effort goes into finishing up those assignments so easily given. He needs to be available to his students, and I have tried to keep reasonable office hours and to be there when I say I will be. An instructor who likes his students will be careful to treat them with respect and good humor. He mustn't take himself too seriously; if he makes a mistake, for example in computation, he won't try to cover it up; he won't pretend knowledge when he's ignorant. He never indulges in sarcasm, nor does he ever make a student feel ashamed for having asked seriously what seems to be a foolish question. He requires as best he can good manners in the classroom, not only by students toward him, but by students toward each other, and by himself toward students. This is a basis for making sure that each student has the maximum opportunity to derive the fullest benefit from his own and the instructor's efforts. Everyone learns from example, and certainly no instructor can expect students to show consideration for one another, let alone for him, unless he himself is clearly fair and considerate in all he does. And in my old-fashioned way of thinking, it seems to me that one way an instructor can illustrate a respect for the importance of what is going on in his class is by taking the trouble to appear neat in dress and person.

Nothing is more important, in my opinion, in working with students than to strive for as fair and equal treatment as possible. Since one must give grades and make judgments about performance, he must be careful to let the student know what is expected of him. If an instructor sets an examination, he should try it out himself to be sure he can answer the questions or solve the problems in the proper time. He must realize that his students have obligations other than to him—let him not habitually run overtime in his class or give impossibly long assignments. Obviously he won't play favorites, and he must act as helpfully towards, and listen as carefully to, the least able and promising among his students as to the most talented. Perhaps he can do more for the latter, but he has both an academic and a human obligation to both. If he's teaching one of several sections of a course, he will cooperate in the effort to treat all sections fairly as to grades and to see that no section suffers from the tendency of an instructor to stray from the subject so that his students are at a disadvantage in the succeeding courses. This kind of thing requires time and trouble, but in providing for large numbers of students, these things assume real importance. I seem to have spent a large portion of my time over the years in such activities, but I believe it has been worthwhile.

To sum up briefly, I think the good teacher has a thorough knowledge of and a real enthusiasm for his subject. He likes his students and treats them as friends. He tries to be courteous, fair, and understanding. He is always himself; he does not put on an act (if he does, he won't deceive very many).

Among all of the elements of my academic life, I find teaching and its accompanying relationship with students a source of deep personal satisfaction. There are few greater rewards than the realization that I have played a part in helping young men and women advance their knowledge and understanding and, hopefully, find happiness and meaning in their lives.

College Teaching—
Theory & Practice

Gordon A. Craig
History

GOLDEN RULES*

1. Always assume that your students are interested and enthusiastic. It helps them become so.
2. Be patient.
3. Remember that students like to be appreciated. Show interest in what they have to say. Operate on the principle that no answer to one of your questions is uninteresting, even if it is irrelevant. If students raise points out of turn, come back to them later on.
4. Remember that your students may be meeting rather mature ideas (about politics, social questions, sex, etc.) for the first time. Be prepared to explain these to them, without showing either amusement or irritation at their *naïveté* and without taking advantage of the occasion to make a display of your own sophistication.
5. Remember that your students have fathers and mothers. Don't insult the old folks when you are confronted with ideas of theirs with which you do not agree.
6. In the same way, respect your students' former teachers, even when you must take issue with what are cited as their views. The students will make their own adjustments.
7. Be honest. Don't be afraid to admit that you don't know or that you have been wrong; but correct the deficiency and don't allow this sort of thing to happen frequently.
8. Don't be afraid to be angry—(students admire honest emotion)—but be sure that your indignation is justified and that expressing it will serve some purpose.
9. Avoid sarcasm. Don't make individual students the butts of your jokes. Never give a student the impression that you are trying to humiliate him before his fellows.
10. Avoid tired wit, off-color stories, and the use of profanity for emphasis.
11. Avoid over-familiarity. You are *not* one of the boys.

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*Reprinted with permission from the *Princeton Alumni Weekly*, January 30, 1959.

12. Watch your personal appearance. Your students will do so.

13. Remember your calling.

To these might be added something that Raymond Sontag once said to me when I was a graduate student: "You'll never get anywhere as a teacher unless you really like students." But, then, that goes almost without saying.

Much of what we try to tell our graduate students about classroom teaching applies also to the lecture, that ancient and honorable form of instruction that was treated at length in an article in this magazine in May, 1957. Among a number of very curious things that were said there was a statement that the lecture was "fantastically" inefficient, because "we read four or five times as fast as we can listen to a lecturer, with far higher comprehension." This may be true of the Editor of the *Alumni Weekly*, but it hardly applies to underclassmen, as will be attested by anyone who has tried to get a sophomore preceptorial to give an accurate *précis* of any reading above the text book level. And the text book level is pretty low these days, what with publishers demanding that anything in the nature of verbal or intellectual sophistication be eliminated because it will be beyond student comprehension. Until Johnny learns to read a lot more effectively than he does, the lecture method is going to remain the best method of introducing undergraduates to complicated or abstract material, of guiding them through the intricacies and detail of subjects like diplomatic history, and of posing problems for later discussion in class or preceptorial.

of intellectual material from each student's particular academic background. In my introductory course I invite the students to challenge the premise of my textbook, that the history of art has played an important role in the attempts of men to come to terms with their environments and to liberate themselves. No subject to which the students have been exposed is irrelevant to this history. The history of freedom is tied to the desire for self-liberation. Let the pscyhology major work from Freud, the philosopher from Aristotle, the political science major from Marx and so on. I ask the students to spend the quarter researching, thinking about, and organizing their material and then to write it during the final exam session. This demands that they search, research, think, organize, condense, all of which makes the material personal and memorable. I want my students thinking about the questions not just in the libraries, but standing in line at the cafeteria or movie house, waiting for a green light, on the pot, or in bed.

I dislike the traditional seminar format. Too much time is wasted. With my eight students divided into four pairs, each week I meet with two pairs separately. One meeting Student A reads or discusses his short, ten-page paper, and Student B, having received it the day before, criticizes it. Then I criticize both. The rules are reversed two weeks later. All eight students read all the papers. Students as critics as well as expositors show me sides of their intellectual makeup and character that otherwise might be missed. I'd rather see students write two or three short papers a quarter than one long one at the end that isn't read till the course has broken up. Teaching a seminar in a quarter is not possible in my field, so this is done over two quarters with the students writing about four or five papers. Big topics are thus cut down into digestible portions, and the students get criticism as they go along.

In small classes I will often exchange exam papers with students and have them evaluate their colleagues without knowing their identity. Often I ask the students as part of their final examination to give me possible questions. Good students are better known by their questions than their answers.

With those graduate students who are doing doctoral work with me I enjoy making them collaborators on projects that lead to books and exhibitions. (Co-authors, and not relegated to a footnote with thanks.) I want my graduate students to deal with actual objects, go through the leg work and sweat of putting a show together, and write for publication so that they leave school under a full head of steam.

Teaching art history means bringing young historians and artists together, no matter what the former's field of interest is. The artist has special knowledge, vision, and experience that every art historian can use and learn to respect. On weekends I'll take a small group of students to Bay Area exhibitions or to an artist's studio. This gets art off the projection screen and printed page.

I discourage undergraduates from majoring in art history. I urge them, as well as those who do major, to concentrate in other areas, to make contact with their peers in science as well as the other humanities. I use the Wednesday Evening Lectures on Art as part of my overall teaching, as a means of bringing distinguished scholars and interesting people from a variety of areas into actual contact with the students before or after the formal lecture. I want my students alert, energetic, and imaginative, not footnote collectors.

What gives me particular pleasure is the teaching of teachers. Having worked with graduate students as teaching assistants for years, I have found that the best system is no system. Find the man's style, where he has confidence and enthusiasm, and let him lead off the criticism after an observed session. I enjoy the weekly and evening bull sessions at my home where we often talk about bad teaching. (We never have to talk about good teaching after these sessions.) With some groups it seems relevant to talk about what an examination can do, or what are the best types of questions that do justice to a bright student's intelligence and work done for the course. I ask the green TA's to work without notes, to learn to talk and think on their feet, which usually proves to be their natural style anyway. I have invited colleagues to weekly sessions to give a 45-minute talk on what for them are the most important generalities in their field, thereby giving the assistants exposure to information they may need, but also asking my colleagues to think about their own areas in different ways after years of specialization. I read all TA examinations and assignments before they are given for wording, clarity, degree of challenge, and often make the instructor answer his own question, if he can. Over the years I've found that the best relationship with graduate assistants is accessibility but firmness, courtesy and not intimacy. Criticism should be immediate, frank, and probing, but always must be followed up by giving the TA a chance to make a comeback in his next class. The quarter system is a teacher killer, it aborts many a TA from blooming. He has been hung up for six or eight weeks. He's learning to swim at the end, and the pool is drained. He is crushed by the tight schedule of exams and papers and has little chance to think, experiment, and just enjoy teaching. I teach in spite of the quarter system. It is the only academic deterrent to the full enjoyment of my profession as a teacher. After my first year of this abomination, I too ask myself, "Elsen, how do you teach?"

On Teaching

Donald Fanger
Slavic Languages & Literatures

One doesn't teach a course, one offers it. The distinction is more than grammatical. The offer requires a taker; the enterprise is a joint one. If it stops being that, it ceases to exist.

One doesn't—at least in the fields of literature with which I am most familiar—teach students, either. By the end of a term, particular students may find that teaching has taken place, but it is not what goes on in the lecture hall or classroom. What goes on there (in the educational sense) is something else. Let me approach it through two personal examples.

Probably the most valuable courses I remember taking as a student were a semester-course that led me through the 5,000-odd pages of Proust's novel, as well as through *The Magic Mountain* and *Ulysses*; and a seminar on fiction, for which I had to read or reread ten novels on which the introductory lectures were based, and then write a long paper on the works of a single novelist of my choosing. Chief among the lasting satisfactions of the first was having read through all those books—having acquired, with a sufficient intellectual framework, that *experience*. As for the seminar, it offered something similar, but more pointed: the long analytical paper, the *performance* extorted from me.

When, to my surprise, I found myself a college teacher, wondering what to do, I turned to those two courses and took a principle from them, which I have tried to follow ever since. It is the principle of making large (non-negotiable) demands on students, asking for a large commitment. For the commitment, when honored, brings the values—experience and performance—and more of them. Light demands make lightweight experience. One cannot know or expand one's capacities except by working up to them; the rest is noise. (I'll explain that later.)

It will be noted that in praising these courses I have not, so far, praised the way they were conducted, but only the way they were set up. There is a lesson of reassurance in this for the distraught young professor (at least there was for one): plan the course well, provide a good and coherent list of readings (along with a good list of secondary references for interpretation and background), require papers from the student and careful attention to them from yourself—and the battle is already more than half won; the greater part of his time will be fruitfully engaged in ways you can enhance, but cannot spoil.

Now about the enhancement. Both of the professors in question were, as it happens, brilliant men. Brilliance can be inspiring, but it can also be dismaying, if its exercise leads a student to despair of emulation. It can leave him dazzled and despondent. The excellence of these particular men showed not least in the way they rationed their most polished lectures and filled the spaces in between with something surely more useful and effective.

Another lesson here: the polished, carefully qualified and definitive-sounding text is best offered to the eye, and not to the ear. Loose ends in a lecture mean questions raised–which is, after all, a main function of the instructor, since his job more properly lies in showing how to pose and attack a problem than in packaging the results. The bravado performance that elicits applause may be an excellent sweetmeat, but the soundest staple of the classroom diet is the lecture that elicits a "Yes, but what about . . . ?" Notes, therefore, will serve a professor better than a written-out lecture; they keep his English fluid, not frozen; and they force him to that coping under pressure which it is his calling to demonstrate. There are dangers–I can remember wondering desperately whether a note that read "Refute Wilson's point!" referred to Woodrow or Edmund or J. Dover, and searching an empty mind while a large class waited–but the dangers are worth running.

The student has been set to reading and writing. What does the would-be teacher, curbing his penchant to dazzle, do in his meetings with the class? I start again with the simplest things. The first and best of them is rereading the assigned texts. Literature, after all, is precisely that writing which demands and rewards repeated reading. In the case of bulky or complex texts, a selective rereading from the podium, with appropriate comment, is likely to be much more useful than any of the more refined exercises, which have to assume that the student's once-through has been enough to let him recognize and remember what is most important.

Literature may also be identified as writing that demands and rewards *slow* reading–as quoting aloud should show. Choosing the passages for quotation, moreover, is itself a critical exercise, and reading them with care will always produce new discoveries. One can then work outward, from the writer's words to a consideration of contexts, certain that contextual matters will appear germane and not arbitrary.

All that I have been speaking of so far constitutes the offer that one makes through a course–an offer which is an invitation to expansion of awareness and skill, through experience and expression. In making the offer, we are not trying to *teach* literature, but to *interrogate* it (or let it interrogate us). We ask and entertain questions, which we must be prepared to justify, and if we do this with enough honesty and intelligence, no one will be able to charge that our enterprise lacks relevance, because that charge is simply a way of saying that a thing is without serious interest.

As for teaching, it will be seen to have taken place when a student has been made aware of problems he hadn't recognized before and led to grapple intelligently with them—when, out of the noise of everyday life, he has been helped to clear a silence in which his thought, confronting the thought of others, can make its own new structures and assume what forms it will. This area of silence is a permanent acquisition. Successful teaching, to alter the metaphor, is catalysis.

Unreliable as they sometimes are, papers and examinations remain the best public tests of whether teaching has taken place or not. At least they discourage an unwise passivity and the defensive illusion that the thought unexpressed is as good as the one set down in words (most of us don't know what we have to say until we've had to say it, and most of us need constant practice to say it well). Papers and examinations, besides, test the teacher. This is important because, for a variety of reasons (some inherent in the system of a large university, some the result of human frailty, but all deplorable), papers and examinations probably constitute the area of education where teachers most commonly fail. Often we are not active enough or tolerant enough or imaginative enough in the setting-up of topics; oftener still we are not careful or clear or full enough in comment on the finished paper or examination.

The most successful teaching, in short, is seen in a course whose basic inadequacies become only gradually evident to the students, whose very virtues come gradually to seem limitations. Less successful by far would be the course whose accomplishments, even at the end, appeared adequate to the subject matter. At this point, it behooves me to hope that something of the same may be true of essays, so that my own oppressive awareness of all the questions begged, skirted, and omitted in these remarks, if shared by my reader, might be taken to justify them, at least partially, in some perverse extension of the sense we call pedagogical.

Some Essential Issues in Education Today

James L. Gibbs, Jr.
Anthropology

The paramount issue in higher education today is whether or not we scholars have the will and the talent to redress those oft-mentioned wrongs of our colleges and universities–wrongs, the belated recognition of which has plunged us into an academic revolution.

Having continually taught students from both freshman to graduate levels and having listened to comments about their education, I cannot but agree with those among them who feel that much teaching in higher education is uninspired, lacking in apparent relevance to non-specialists, and sometimes unrelated to wider social concerns. The diverse causes are more than familiar, particularly the focus on research and graduate training, which produces many ills. It leads to highly specialized courses oriented to the preprofessional major. It has caused administrators to evaluate us in terms of our research results, which–significantly–we term "output." Generally, we have come to evaluate ourselves in the same terms. We measure academic achievement largely by our research and publications rather than by the amount of learning we have inspired, the curiosity we have aroused, or the qualities of mind or character we have helped to implant in and nurture in a young person.

To paraphrase Martin Luther King, I dream of a world in which my children's professors will be measured not only by the number of pages they have written, but by the number of minds they have inspired and challenged. It may be that the actions of today's rebellious students will be the catalyst that results in the fulfillment of that dream. But its fulfillment depends on the imagination and will of faculty and administrators as well as students. As concerned scholars, how will we answer the following questions?

Do we have the ability as well as the will to achieve a better balance between teaching and research? Will we support daring administrators who will recruit and promote faculty less on the basis of publication potential and more on the basis of demonstrated teaching excellence? Will we attempt to persuade public and private foundations to support scholars who wish to devote time to researching and writing better lectures or to devising new teaching materials to the same extent that they support those who wish to create new knowledge? Will we lobby as effectively with government for support of teaching as we have for support of basic research or physical facilities? Most difficult of all, will we seek and respond to evaluation by our clients–our students–in the same measure that we seek and react to that of our peers?

Do we have the creativity to find new definitions of what–again, with significance–we call our "teaching *load*"? Because it is the non-classroom teaching hours that largely determine the significance for the student of what he does learn in the classroom, the teaching *commitment* should include hours spent in counseling, advising, and informal discussion as well as those spent lecturing. Do we have the skill to persuade our administrators to count all of this teaching in setting expectations for faculty performance?

Will we find the time and insight to inspire and to train our graduate students to be more committed teachers than we are ourselves? Or, will we continue to act as if skillful teaching is based on nothing more than capricious inspiration?

Do we have the will to make our teaching more imaginative? Will we experiment with novel course formats, new instructional devices, less rigid course requirements, or the substitution of activist-oriented field experience for more traditional field experience?

The nature of this problem in higher education has been analyzed everywhere from high-level foundation reports to government task forces to popular magazine articles. The solutions have been enumerated often enough. Now the sense of urgency has reached the point where we must find the will to implement the oft-suggested solutions or face deleterious changes in the Academy.

Learning and Teaching

Edwin M. Good
Religion and Hebrew

It is easier to teach than to talk about teaching. That is to say only that it is difficult to teach, but inordinately difficult to talk about teaching. But I have been bidden to talk about teaching.

Perhaps one of our problems in the University is that we take teaching too seriously. That sentiment may seem strange from one who has made something of a career from pleading the importance of teaching. I do not retract anything I have said about the importance of teaching. But it may profit from a new context.

Students take teaching far too seriously, that is clear. To be sure, they have a remarkably sharp perception of good teaching. But they take it seriously in that they depend too heavily on it. They too readily assume that without a good teacher they cannot, or will not, learn the subject. Let a student begin to penetrate a subject, however, to gain some maturity and independence in it, to achieve some confidence in his abilities at scholarly work or research, and you will find him saying of some professor, "He is a wretched teacher, but I learned a great deal from him."

Professors take teaching too seriously too. Some, indeed, take it so seriously that they will use all sorts of excuses not to do it, lest they should prove less than adept teachers. But on the whole, professors take teaching too seriously in the same way students do. They readily assume that the student cannot, or will not, learn the subject without studying it in a course under a good teacher. Yet the highest compliment a professor can pay to a student is this: "He showed me something about my subject that I never knew before." And that is to say that the best student is the one who functions as a teacher.

The roles become badly confused here. Let me suggest a way out of the confusion. What happens in the educational process is *learning*. The difference between the university and the college is that the former fosters learning on a very broad scale, from the neophyte freshman to the most advanced, original scholar and researcher, whereas the college is a specialist institution, putting its focus on learning at two levels: that of the undergraduate student and that of the scholar whose learning is principally in the service of helping the undergraduate student to learn. As a university, Stanford implicitly asserts the continuity of the learning that transpires here from one end of the scale to the other. (Some educational befuddlement might be dispelled by making the assertion explicit.)

The only factor that distinguishes me from my students is that I know more about my subject than they do. My creativity (whatever it may be) consists in my longer experience with the subject and perception of certain kinds of problems, together with my greater technical knowledge, enabling me to move toward solutions of those problems. But what brings me and my students together may be more important than what distinguishes us: the fact that we are both learning the subject. Certainly I frequently tell a student something he did not know, which I have discovered. My colleagues in the field spend much of their lives telling me, by their books and articles, what I have not known about the subject. Students often mistakenly suppose that their professors are masters of their subjects. Professors hopefully know better.

Thus only a small part of what the teacher does is to teach. Mostly he learns more and more about his subject (which is why the distinction between teaching and research is finally fallacious) and assists as the student learns more and more about it. If teaching consisted merely in pouring into the student what the professor knows and thinks, it would be relatively easy to do, and it would not be worth the cost. What the professor knows and thinks is of no especial value until the student comes to know it too, not merely from having been told by someone older and more learned than he but from having discovered it for himself. "To learn" is an active verb. The student's fault is that he is all too willing to expect that someone will teach him, thus permitting him to forego the necessity of learning. The professor's fault is that he is far too willing to tell students what he knows, supposing that that constitutes teaching.

But teaching is nothing other than an enablement of learning. "An" enablement, I say, not "the" enablement. Libraries and laboratories, books and bull sessions, concerts and conferences are also enablements of learning. What matters is that persons come together over a subject of study. The teacher already has a lead in the learning, but he is there to help the student close the gap as quickly as may be. Teacher and student work together on the learning, and the best teacher is he who most efficiently turns the student's mind to the subject, helps him to find his own way. The best student is he who most quickly and effectively plunges into the subject, gratefully accepting the aid the teacher offers but insisting on making the discoveries himself. Students should study not professors–it often takes them some time to realize that–but subjects. By the same token, professors should not teach themselves–some of us never learn that–but should step aside in favor of the subject.

The foregoing paragraph is, of course, utopian. Students will continue to depend upon teaching performance, and professors will continue to project themselves and to presume that their own learning takes place in study, library, or laboratory rather than in the classroom. Students will continue to complain of the time and energy that professors put into research and will erroneously suppose that in a university everything should revolve around them. Professors will continue to seek lighter class loads and will erroneously suppose that one can impress his colleagues only by massive publication.

If the University might come about to the position that its task is learning, and if all of the University's members might dedicate themselves to learning, some of our misapprehensions could be mitigated. We might recognize the continuity between research and teaching and between teacher and student. We might have a higher appreciation of the continuity between classroom and library, laboratory, rehearsal hall, and studio. And then, perhaps, neither students nor professors would take teaching quite so seriously and self-consciously as they now do. Courses might become not the entirety of education, as they now are, but provocations to education. We might devise means of assessing the educated mind that are sharper than the dull, unrevealing catalogues of titles, units, and grades that now comprise the transcript.

Learning does not easily lend itself to routine categorization, and that makes it exciting. It keeps running beyond itself, not only into the library but through the library into broader human affairs. Some may be so infected by learning's excitement that they will stay on in the library for their lifetimes. Others may be so infected by it that they will pass their lives out beyond the library. Neither locale is intrinsically better than the other. One may be authentic or inauthentic, to borrow the existentialists' term, in either. For both, learning and the ability to learn are indispensable.

Some Thoughts on Teaching

Konrad B. Krauskopf
Geology

Teaching is fun. If it weren't fun, there wouldn't be much point to it. Nothing is duller or less productive than an attempt at teaching by someone who is not enjoying himself. When a teacher tells you how hard he works, how tired he gets facing a class, how frustrating it is to be exposed day after day to the depths of human ignorance, he is assuredly telling you the truth. But just as surely he is having a good time, because he is doing something that he can do well and that he thinks is worthwhile. One can sympathize with a teacher's troubles, but not too deeply, for one must also envy him the pleasure and fulfillment he finds in his job. Without this sense of fulfillment, this faith that the activity is necessary and constructive, a would-be teacher might well spare himself the effort. There must be joy in teaching or it is a hollow exercise.

It is hollow because teaching in a formal sense is impossible, if by teaching is meant the direct transmission of knowledge from one mind to another. A student *learns*–this is an activity we all know from our own experience, an activity that a student can feel within himself and that we can measure by external criteria. But when we say we *teach*, we do no more than provide aids to the learning process. It is the student who is purposefully active, not we; he can learn without us, if his motivation is strong enough. Brilliant though our lectures may be, clever though we are in constructing outlines and syllabi and problem sets and laboratory projects, our activity is meaningless unless it inspires activity on the student's part. His progress can be felt and measured; our progress in teaching is a matter of faith. We can imagine we have turned in a brilliant performance, but we never know whether we might have evoked greater response by some other approach. And we delude ourselves if we think we do more than supply a little push and a little lubrication for the wheels that go round in a student's head.

Not only is teaching impossible in itself; even its goals are all but impossible to define. We can expect, of course, the simple teaching of skills. If a student wants to learn how to express elementary ideas in a foreign language, how to solve a given mathematical problem, how to handle a piece of laboratory equipment, his goals and ours are limited and specific. We can help him, and the best manner of helping can even be set down in rules of teaching that have been tested by experience and backed up by psychological theory. So formalized may this kind of teaching become that it can be programmed for machines or itemized in a step-by-step procedure that can be taught by someone totally unfamiliar with the subject matter.

But most of us want to be more than machines, to think that we teach something beyond the simple skills of our crafts, and it is here that goals become hazy. Should we try to make students' minds into replicas of our own? Or do we hope only to implant a few basic ideas, from which student thoughts will blossom independently? Do we seek to inculcate the values that lie behind our various disciplines, or do we trust that development of values will take care of itself? Do we emphasize ideas that we think an educated man should have at his command, or do we give students free rein and simply help them explore whatever ideas have momentary appeal? Is our aim to encapsulate as much as possible of humanity's hard-won knowledge into the brief years a student can devote to being educated, or should we excite his imagination with a few subjects and trust him to complete his education in later life? To all these questions there are no firm answers. The fashionable answers change from one decade to the next, as is all too evident from the shifting aims of education expressed in college catalogs and curriculum committee reports. How little we really know about the goals of teaching becomes painfully clear on re-reading the eloquent manifestos of educators a generation back, educators who seemingly believed that they had at last discovered the true ends of the teaching process and the way these ends could be attained.

Because teaching is so much a matter of faith and because its goals are so ill-defined, it is necessarily a highly personal enterprise. Beyond the imparting of simple skills there are no rules of teaching, there can be no rules. All of us, I am sure, have vivid memories from our own student days of teachers who used widely various methods and yet managed to give us a bit of knowledge or wisdom or inspiration that has guided and enriched our lives. All of us also, in our experience as teachers, have learned that students are infinitely variable in the ways they learn, that methods of teaching effective for one student may be quite inadequate for another. And probably we have all had the sobering experience of finding that colleagues whose teaching techniques are very different from our own (and therefore, of course, inferior) somehow succeed better than we do in giving students the urge to learn. Because teachers are so different and students are so different, and because the student-teacher relation that is effective in individual cases is so unpredictable, methods of teaching cannot be usefully codified.

I have heard it proposed that graduate students who aspire to careers in college teaching should be given formal training in pedagogy. For subjects where the learning of skills plays a major role the suggestion may have merit, but much of college teaching is (or should be) so personal that training could accomplish little. The teachers of our college days whom we remember most fondly did not impress us because of techniques they might have learned in formal training. We remember them for more personal characteristics–for the depth of their knowledge, for their infectious enthusiasm, for their patience in clarifying difficult points, for their wisdom and judgment, for their ability to lift us out of ourselves and expand our horizons. These are the qualities that make memorable teachers, and they are qualities that cannot be taught.

To these qualities should be added one other, an interest in the welfare of the individual student. There can be good teaching without this, but when concern for the individual is combined with other qualities the teacher can make his most lasting impression. Given sympathetic understanding for each student's progress, the formal methods a teacher uses are of little importance. Even the subject matter, within limits, is not of primary concern. A teacher with sufficient depth of knowledge, sufficient enthusiasm for his subject, and sufficient interest in his students can make almost any topic come alive. What matter if the subject is not "relevant," not "practical," not narrowly pertinent to the student's field of specialization? If the teacher persuades each student that here is a corner of the universe worth exploring, that each in his own individual way can derive something of value by putting in effort, the necessary spur to learning is provided. This incentive to learn–and to keep learning after the first glow of enthusiasm for a new subject has cooled–is the most valuable thing a teacher can give, and he gives it most effectively by a personal concern for each of his students.

Were I to formulate a word of advice for a young person planning to teach at the college level, it would go something like this: pick a subject that you like, and about which you have both depth of knowledge and a certain missionary fervor; try different methods of teaching, but be skeptical of formal rules; learn from your colleagues who have taught longer, but remember that there are many good ways to teach and that no one method is successful for all instructors and all students; keep in mind that each student is an individual with his own problems and his own ways of learning; and reflect above all that you will never actually *teach* anybody anything, that your function is to persuade students to learn on their own. The incentive to learn, insofar as teaching has any meaning at all, is about as close as we can come to defining its ultimate goal.

Reflections on Teaching

Gerald M. Meier
Economics

I. On the Quality of Effective Teaching

Teaching is a high art: cold formulae or rules about effective teaching are completely alien to the vitality and life of inspired teaching. The best type of educational teaching–in contrast with training–cannot be characterized simply in terms of the teacher's "knowledge of subject," "adequate preparation," "clarity in communication," etc. These may, of course, be necessary ingredients, but they are technical abilities that pertain to only the lower levels of teaching.

To me, the distinguishing features of the best type of teaching go far beyond these technical abilities. The "best" teacher always has two subjects: his discipline, and–of equal importance–his students. Regarding the latter, the best teacher has an uncanny insight into the different capacities, different needs, and different interests of his students, and he couples this insight with care and concern for what the individual student might become. It is his worry over the second subject-matter–namely, the individual student–that makes the best teacher so much more than a mere transmitter of knowledge.

When the best teaching occurs, the student gives to himself. The teacher acts as an intermediary between his discipline and the student's world, but the teacher is successful when by one means or another he causes the student to lose himself in the subject-matter and inspires the student to learn for himself. Although the best teacher is a catalyst for the student's discovery, he teaches in such a way that the student can learn to do without him.

From the foregoing, certain implications follow that might help explain why so much of present-day teaching falls short of the best:

1. Too many teachers overteach. The best teacher exercises self-discipline, has a fine sense of timing, and retains a reservoir of unexpressed thoughts.

2. Too many teachers delude themselves into trying to teach great truths, instead of undertaking the much more difficult task of teaching simple truths in a great way.

3. Too many teachers lack humility and modesty with respect to what students can learn from their subjects.

4. Too many teachers retreat into overspecialization at the expense of a loss in breadth of knowledge. The student is necessarily an amateur in the teacher's specialty and is already being fragmented into taking courses, studying a number of subjects, and acquiring hundreds of bits of information. Somehow and somewhere, the student seeks some model of integration. No one teacher can give him this; but if all his teachers are self-sufficient specialists, the student's longing for coherence becomes unduly aggravated.

5. Too many teachers believe that research detracts from teaching. Some kinds of research may do so, but other kinds can strengthen teaching. An excited researcher can do more to convey the quality of the intellectual life than can a well-prepared but prosaic teacher. Most important, what will be taught as tomorrow's subject-matter should be born out of today's research. Research and teaching should be complementary; the one is bound to be poorer without the other.

II. On Encouraging Effective Teaching

If teaching is now to acquire parity with research, *more should be demanded of the teacher*. A higher form of teaching is needed, and the element of routine should no more persist in teaching than it does in the best research.

It is difficult (if not impossible) to induce more effective teaching, but the educational environment certainly should not impede it, as it now does. Some basic reforms in the educational structure are therefore necessary to make the environment more congenial for the best type of teaching:

1. The central difficulty is that the University environment is too homogeneous, dull, and stale for the student. He has already lived at least a decade in basically the same kind of educational environment. Surely upon reaching the University, he should be allowed to break the routine. Diversity, variety, and change of pace are essential if the student is to be enabled to experience and appreciate the finest teaching.

This calls for more than tinkering with the curriculum or marginal changes. Drastic reform is needed to allow the best kind of teaching to take place in an environment in which the dominant tone is not set by the historical constraints of the so-many-class-meetings-a-week, week-in-and-week-out, conventional type of classroom course. The teacher is necessarily limited if the student is led to believe that he can not know something unless he has had a course in it, and that he cannot know how well he knows something unless he has been graded in it.

It is now the average run of teachers who find this kind of environment most comfortable and reassuring; but while the student comes looking for teaching, what he gets in this environment are once again the old requirements, units, and grades.

2. A student body of higher quality and greater diversity is also needed–not because (as is sometimes said) the faculty can then teach "more," but because so much of the best teaching is done by students teaching each other.

3. The teaching function and the examining function should not reside in the same individual. The best teacher is handicapped when the student necessarily views him as also his examiner. The business of a teacher is to teach, not to judge his own students. When it becomes the latter, only the strongest of students can avoid tending to become passive, imitative, and inhibited by never forgetting that judging is being mixed with teaching.

4. Such are the ways of the modern university that if the best teachers are to devote themselves wholeheartedly to teaching, they must acquire institutional power equivalent to that of the research professoriat. *Only his local institution–and not his profession–can speak out for the teacher.*

An Essay on Teaching

Daniel M. Mendelowitz
Art

I can think of no more difficult assignment than writing an essay on what constitutes good teaching, which is essentially what I have been asked to write. I think good teaching is, in essence, establishing a relationship between students and a teacher that leads students to a deep and meaningful involvement with a certain area of subject matter, or discipline, to use a more contemporary term.

Each of us can look back on our own education and select a few teachers who made an unusually strong impact upon our minds, emotions, and aspirations (professional and otherwise), and consequently stand out in our memories as great teachers. The fact remains, however, that since no two individuals are identiçal, different types of teachers and teaching inspire different students. I have never known of a teacher, no matter how dull many students found him, whom other students have not proclaimed "great teacher and a source of inspiration." I have also never known of a teacher who was almost universally considered excellent, whom some students have not denounced as an "actor," as "superficial," etc. It is this paradox that makes the definition of fine teaching so difficult.

Let me depart from generalizations and think back on my own education for a moment. About four teachers stand out in my memory as having had a significant impact upon my development, and they fall into two categories. Two of these teachers, not in my professional field, impressed me because they communicated a sense of authority about the subject which they taught. Both individuals were vigorous personalities, spoke fluently and energetically, knew their subjects thoroughly, and had a feeling for the dramatic presentation of ideas. The forceful impact of their personalities made them memorable teachers, which, in turn, made the subjects they taught living entities that have remained dynamic elements in my intellectual life ever since. One of these persons was a man who taught economics (a subject in which I had not had the slightest interest before I took his course). The other teacher was a woman who taught Shakespeare, a woman who has become almost a legend at Stanford because of her aggressively contentious personality. Sometimes loved, frequently disliked and feared by students, I found her to be an exciting and inspiring teacher of literature, as did many students. It should be noted in passing that a teacher with an abrasive personality may be provocative and stimulating and can, for that reason, make a greater impact upon students than a bland personality to whom students feel indifferent.

Two teachers from my professional field (art) stand out as the major influences in my intellectual and artistic development. One, a woman, was a high school teacher, the other, a man, was a college teacher. Both individuals were accomplished artists with a superior command of their professional field. More important, both took a strong personal interest in my development as an artist, both were fond of me as a person and had great belief in my talents. This strong bond of friendship, growing out of a professional teacher-student relationship, was probably the most important catalyzer in my career.

A few years ago I was asked to participate in a conference on creativity in which artists, writers, musicians, psychologists, and sociologists participated. The conference was organized with the hope that certain common denominators of experience might be discovered which could lead to an understanding of the creative process, which, in turn, would enable teachers to stimulate the creative potential of students. One of the most universally agreed upon opinions that came from this conference was that creativity most frequently occurred when people with intense common interests worked together, often in a master-apprentice or teacher-student relationship. The interchange of ideas, the excitement of discovery, the stimulus of mutually shared experiences seemed to be almost the only universal element present in creative situations. As a corollary, it seemed that the routine class situation in which there were few personal contacts and little of the excitement of discovery tended to result in the most sterile educational situations. It was also noted that groups of individuals working together outside of the framework of classes and educational institutions frequently achieve a high level of creativity, as was evidenced by the French painters from about 1860 to 1920, by the "Eight" (the American Ash-Can School), of 1905 to 1920. I am certain that professionals in other fields can think of many analogous situations.

So far, then, on the basis of my own experience as a student, I have indicated that I think decisive factors in my education were teachers who had an unquestioned competence in their field, had vigorous personalities, and, most important, evidenced a strong friendship for me based largely on a belief in my potentialities as an artist. I have indicated that the teacher who is meaningful for one student may not be for another. It would seem to me almost impossible to set up formal criteria by which to evaluate teaching effectiveness for promotional and tenure purposes. Many a so-called "stimulating" or "popular" teacher is simply a good entertainer and may not make any great impact on students' lives. I can remember some college teachers that I thought were very good teachers, who, in retrospect, seem to have had little permanent influence on me.

Certain common denominators of adequate teaching can, and perhaps should, be pointed out. A good teacher should be able to communicate ideas clearly, should be able to organize class work well, and should be sufficiently interested in teaching to put energy, invention, and thought into the teaching process. He should be accepting of the variations in student behavior, sympathetic toward youth, and feel challenged rather than threatened by the questioning attitudes which young people frequently display toward tradition and the accumulated knowledge which constitute much of the stock-in-trade of the teaching profession. On the other hand, a teacher can have all of these attributes and still remain a rather conventional medium for transmitting knowledge and therefore not achieve much more through his teaching than a good, well-organized textbook achieves. And, conversely, an individual may have none of the qualities mentioned above and still stimulate a creative ferment in the lives of a few, exceptional individuals who, in the final analysis, may have a greater effect upon society at large than can possibly be achieved through the mass influence of a popular professor, who on the surface might have appeared to have influenced thousands of lives.

I am not cynical about education or the value of attempts to improve it, but I certainly do not have any organized ideas about how university teaching might be improved nor as to how effective teaching might be identified. I think it likely that successful undergraduate teaching may be very different in character from effective graduate teaching, which may demand a different type of teacher with more specialized abilities closely related to the professional area of activity.

I do have one firm set of convictions, and they focus around the idea that the greatest danger to modern education (modern life, in fact) is bigness. As institutions grow, they must become systematized and standardized to insure consistency of performance and standards on the part of the individuals who perform the duties provided by that institution. With administered systematization and standardization come a tendency to value conformity, moderate personalities who aren't bumptious, and a general leveling of personality, which, in turn, prove restrictive to some of the vigorous authoritative individuals, who, in my judgment, are the professors who make the greatest impact upon students through their teaching. Also, bigness decreases the opportunities for students and faculty to work closely together and to inspire one another by their mutual achievements, affections, and interreaction. So it seems to me that one thing to guard against is over-size classes and teaching situations which create barriers between student and faculty contacts.

The word barrier brings to mind another factor that I think diminishes teaching effectiveness and minimizes opportunities for a stimulating interaction between faculty and students. That is the grading system. As long as a system of rewards and penalties exists, students inevitably are on the guard in their relationships with faculty, and faculty, too, erect a system of mechanical evaluations along with certain defenses of that system that militates against a free interplay of personalities. I would like to see grading reduced to 1) pass, 2) a grade to indicate "superior achievement," and 3) no punitive failures. If a student did not achieve in a class, he simply would not receive credit for the class. I wish that I had experienced my student-teacher years without the burden of assigning an A, B, C, D, or F (not to mention pluses and minuses) to every student in every class. I think I could have had a more honest relationship with a greater number of students and so have been a more effective teacher.

Memorandum on Undergraduate Teaching at Stanford

John L. Mothershead, Jr.
Philosophy

An hour's study of the *Stanford Course Reviews* and *Scratch Sheets* (some of which have been serious attempts to be objective) from 1957–58 to the (largely destructive) *Daily* supplement of May 27, 1968 discloses that lack of organization of the material is the most common corrigible adverse criticism of the courses covered. Other points frequently criticized are the quality of the reading assignments, their relevance to the lectures, the out-of-class availability of the instructor to his students, and most importantly, his attitude toward the students. My impression formed from the various criticisms made is that whatever ones could be *voluntarily* met *would be* met if the teacher really cared about undergraduate teaching, which obviously prerequires that he cares about his students. To the extent that he does care and has the time or makes it, he will organize his material, relate his assignments to it in a meaningful way, and be available to his students at regular office hours. Adverse criticisms to the effect that the teacher is uninteresting, uninspired, or unenthusiastic do not, I think, help very much, for one so called is unlikely to be able to become interesting, inspired, or enthusiastic at will. It is just a fact that some excellent scholars are poor undergraduate teachers, and some believe in the cliché that "undergraduate teaching is the casting of sham pearls before real swine." Two courses of action are suggested by these circumstances. We should begin to do what we pretend to do but really have never done at Stanford—nor has any other university of the first rank that I am acquainted with done it—namely, take teaching ability seriously in making appointments and tenure promotions or else so provide that scholars whom we wish to employ or keep who do not teach well are not given the opportunity of doing so. By "taking teaching ability seriously" I mean simply don't hire or retain faculty members *as undergraduate teachers* who are not good at it.

Suggestions such as the above are usually met with the contention that it is impossible to assess teaching ability. Student-teacher ratings often confuse "flashy" or "popular" teaching with good teaching, and the "dull" teacher who receives a low rating is often one who has the greater beneficial effect in the long run. There is some truth to these claims, but they are mostly exaggerations. Students are in fact the only ones who *can* assess teaching ability, barring the academically unacceptable practice of class visits by senior faculty committees. Apart from these, faculty opinions of the teaching of their colleagues are nearly always heresay reports from their students, which are surely *less* reliable than *careful* student ratings. What is needed are systems for obtaining responsible and objective student judgments. The SES questionnaire on course rating used in 1968–69 is the best effort along this line that I have seen so far, and I hope it will be carefully tested and improved in the years ahead.

Assuming a reasonably valid faculty rating procedure, there remains the problem of a means to ensure its use in considering tenure appointments at Stanford. Under the same assumption, the ideal would be a system in which such a rating, with the permission of the person concerned, could become a regular part of the dossier which is reviewed when a faculty member is considered for appointment or promotion here or elsewhere. Undergraduate teaching would surely be vastly improved in the United States if this were generalized. It would of course need to be accompanied by a recognition that not every scholar or scientist who is desirable to appoint need be an undergraduate teacher. There are productive scholars who are excellent at directing dissertations or graduate student experiments who do not want to teach undergraduates and are not good at it.

Another matter that stood out in my review of the course reviews was the virtual unanimity with which the teaching of sections of large courses by TA's was panned. I found this alarming. TA's are after all apprentice teachers. One has to begin teaching at some point, and he is not likely to be so good at it when he begins as he will become with experience. This suggests to me that a separate rating might be developed for individual TA's, which would take account of the difference between rating beginners and rating professionals. Students doing the rating would need to have it explained to them, and it would no doubt emphasize looking for signs of possible strength and avoid devastating adverse generalities that would not help the person being rated. Such a rating could, with the permission of the TA, be made available to his department for evidence in writing letters of recommendation; and eventually, as the system improved with experience, it might be a regular part of the dossier to go with the transcript to institutions considering him for employment.

There are many other things I would like to say about undergraduate teaching and teachers, especially in response to current student criticism to the effect that much teaching at this level is impersonal and irrelevant. The five-page limit of this assignment confines me to two of them.

Undergraduate teachers can and should recognize that they are teaching individual human beings and that this is different from programming computers. The first implication of the recognition of the humanity of students is an attitude of openness on the part of the teacher. He must adjust to the people in his class. Undergraduate students are quick to detect the least sign of affectation. They do not like being talked down to. They hate arrogance and respond with counter-arrogance. Professorial sarcasm is *never* effective. The second implication of the recognition of humanity is recognition of the need to take account of individual differences. This can be done within limits even in large lecture classes. Questions can be encouraged and taken seriously. They nearly always relate to some obscurity in the lecture. Papers and examinations can encourage original thought. The considerable effort that it takes to make careful comments on student papers must be made. A lecturer must watch his class carefully and adjust what he says to how well the class follows him. Students' faces light up when they understand something. Signs of boredom can be recognized and needless repetition avoided. There is no excuse for lecturers who simply read their lectures. This type of lecturing was outdated by movable type.

The current fashion of opposing lectures altogether in favor of seminars and individual work not only faces obvious economic problems, but fails to recognize that there are problems with these other methods of instruction. In many seminars, there is an organizational meeting after which students listen to each other read papers. The proper business of seminars is sensitive, disciplined discussion, and this will fail if all the students have not previously read the materials to be discussed. Individual work can of course be anything. The move toward more individual work is sound only to the extent that students are willing and able to undertake more responsibility. There is evidence that many students at Stanford are willing and able to do this. However, even these students need some guidance in their studies such as is afforded by a combination of lectures and disciplined discussion.

Unfortunately, not all undergraduate teaching, even at universities such as Stanford, is scholarly teaching. There is a danger when a teacher tries, as he ought, to be open to students that he may let down his critical standards. This danger is apparent when we hear a professor speak of "my own work" and mean by it his productive scholarship *as contrasted with* his teaching. It is hard work to upgrade courses every year in the light of increasing knowledge in the field and the instructor's own additional experience. Yet to fail to do this is to fail to be a scholarly teacher. Charisma may guarantee popularity as a teacher, but the differences between inspiring and instructing are not overly subtle. It is splendid if you can do both, but the former is not a substitute for the latter. If scholarship is not employed in teaching there is simply no point in appointing scholars to be teachers. What happened at the University of Chicago a generation ago should have taught us that we cannot maintain a first rank academic institution if those who teach undergraduates are different from those who are scholars.

My argument may be summed up by saying that undergraduate teaching should be carried on by scholars who are open to students, who like to teach, and who do it well. It is possible in principle to find out who these persons are, and we should do this. I believe it can be shown that it is such teachers who not only succeed in communicating knowledge but who also produce in their students by their example a style of careful, critical thinking–a style modified by the differing gifts of different students. I believe it could further be shown that it is the student who has acquired a style of careful thinking adapted to his own talents who is motivated to further intellectual efforts after leaving the university whether he becomes a professional scholar or not. It would be difficult to establish these points, but it might be well worth the effort. We have done woefully little in the matter of examining our products in order to judge the measure of our success or failure.

July 21, 1969

To the SES Steering Committee:

In answering your letter of July 15, I send you enclosed:

(A) The major part of the preface to a textbook that should appear in the next months.

(B) My favorite quotations, which I am used to presenting to high school teachers who come to Stanford for additional training.

I wrote several books on your question, but (A) and (B) have some chance to be useful in themselves.

With best wishes

G. POLYA

George Polya
Mathematics

Take care of the sense, and the sounds will take care of themselves.
Alice in Wonderland

After having lectured for several decades on complex variables to prospective engineers and physicists, I have pretty definite and, I hope, not unrealistic ideas about their requirements and preferences.

Students are students. They have to take several courses and so they are liable to study some subjects just for the examination. Yet they may, and the more intelligent and the more purposeful do, ask pertinent questions about the subject: Is it interesting? Can I use it?

We should realize that these questions are fully justified. The instructor of some more advanced branch of mathematics, such as the theory of complex variations, who is a mathematician should try to put himself into the position of his students who are prospective physicists or engineers. Before going into heavy definitions and lengthy proofs, the student wants to satisfy himself that the subject is interesting and useful enough to expend his time and effort on such definitions and proofs.

Having realized such points as I taught successive generations of students, by and by I adapted my lectures to their standpoint. I said to myself:

> Start from something that is familiar or useful or challenging: from some connection with the world around us, from the prospect of some application, from an intuitive idea.
>
> Don't be afraid of using colloquial language when it is more suggestive than the conventional precise terminology. In fact, do not introduce technical terms before the student can see the need for them.
>
> Do not enter too early or too far into the heavy details of a proof. Give first a general idea, or just the intuitive germ of the proof.
>
> More generally, realize that the natural way to learn is to learn by stages: First we want to see an outline of the subject, to perceive some concrete source or some possible use. Then, gradually, as soon as we can see more use and connections and interest, we take more willingly the trouble to fill in the details.

Twelve Aphorisms

1. The ideas should be born in the student's mind, and the teacher should act only as midwife.

Socrates

2. What is good teaching? Giving opportunity to the student to discover things by himself.

Herbert Spencer

3. Thus all human cognition begins with instructions, proceeds from thence to conceptions, and ends with ideas.

I. Kant

4. Learning begins with action and perception, proceeds from thence to words and concepts, and should end in desirable mental habits.

5. Beauty in mathematics is seeing the truth without effort.

6. The beauty of a theorem (of a proof, or theory, or classroom presentation) is directly proportional to the number of ideas you can see in it and inversely proportional to the effort it costs you to see them.

7. Intuition is the conception of an attentive mind, so clear, so distinct, and so effortless that we cannot doubt what we have so conceived.

Descartes

8. If Euclid failed to kindle your youthful enthusiasm, then you were not born to be a scientific thinker.

Einstein

9. Nothing enters the mind more readily than geometric figures.

Descartes

10. We can represent the ideas of all things by geometric figures. The infinite multiplicity of geometric figures is sufficient to express all differences between observable things.

Descartes

11. Nothing is more important than to see the sources of invention which are, in my opinion, more interesting than the inventions themselves.

Leibnitz

12. No matter what the subject is, what the teacher ultimately teaches is himself.

Some Thoughts on Classroom Teaching*

Leonard I. Schiff
Physics

Teaching is conducted in many ways and at many levels. In physics, as in many other subjects, it covers the range from the pre-college through the post-doctoral level and extends on to self-teaching with the guidance of colleagues. I shall concern myself here with classroom teaching in physics during the college and early graduate years.

The change that I find most striking in the years since World War II is the increase in numbers of students. Graduate classes at Stanford are five to ten times as large as they were in the late 1940s, and enrollments in freshman and other undergraduate courses have risen several-fold, although not as dramatically. I do not think these larger class sizes are necessarily bad, as is often assumed. They may even help in the elementary courses, where they tend to make a large investment in ancillary equipment and services for demonstration experiments more feasible. It seems to me that the important thing is that some two-way contact be maintained between teacher and student. Then the teacher can strive to adapt his explanation so that the student can enhance his understanding. But both teacher and student must remember that the student must provide his own understanding–it can be stimulated by the teacher's explanation, but never supplied by it. The stimulation is most effective when the student has the opportunity of responding in some way to the lecturer–with affirmation that he has understood, or with questions to indicate that he has not. Some students will never respond, even in a class of ten. And a teacher can usually get a response from some of the students even in a class of hundreds. There is of course some maximum class size at which two-way communication breaks down–perhaps fifty for some teachers and five hundred for others. To me it seems that the loss of this feedback from student to teacher is the most serious casualty of television teaching. Television has been used successfully to enhance the visibility of small-scale demonstrations. But if it has the effect of isolating the teacher from his class, it should be used only after the most careful search for alternatives.

What is it that makes a good classroom teacher? It seems likely that most of us learn what lecturing skills we possess from thoughtful attention to the strengths and weaknesses in the lectures of others: our teachers at an earlier stage, and our colleagues now. But there are three characteristics without which it would seem that good lecturing is impossible. First, the avoidance of sarcasm under all circumstances is absolutely essential. It is a despicable tactic destructive of communication between teacher and student, and hence the antithesis of good lecturing. Second, the lecturer must be willing to display his ignorance. It is apparent that no one knows everything. A bright student in almost any class can ask a question that even a well-prepared teacher cannot answer satisfactorily–and students should be encouraged to ask questions, even unanswerable ones. It is far better to confess ignorance than to pretend knowledge–and much easier to get away with. There is always the next lecture, by which time some sort of a response can be prepared. Third, the good lecturer evaluates carefully the needs and abilities of his audience and adapts the presentation of his subject accordingly. This, along with modesty in one's claims of knowledge and the avoidance of sarcasm, seem to me to comprise the essential characteristics of good lecturing.

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*Adapted from a speech given in January 1966.

Failure to adapt the presentation to the audience is a fault that is sometimes blamed on too great an involvement with research on the part of the teacher. It has sometimes been said that the teacher who is also engaged in research tends to talk "over the heads" of his students because he knows too much. Or that he does not have time to prepare his lectures properly because he is so absorbed in his research. Or that he has no interest in teaching, and only does it in order to retain academic prerogatives. I have no doubt that examples can be found to support one or more of these charges. But there are also many persons, and I believe many more than of the type just described, who are deeply and harmoniously involved with both teaching and research. Certainly it cannot be said that a commitment to research is incompatible with good teaching, nor can it be said that lack of interest in research guarantees that teaching will be done well. So far as competition for time between teaching and research is concerned, my own experience is that this is not a serious problem. At the same time, I must admit that administrative and committee responsibilities have all too often interfered with both teaching and research.

I would not argue that an involvement with research is essential to good teaching, but on the whole I believe that it is of substantial help. The improvement comes through a greater depth of understanding, through an enhanced ability to explore the subject with the student from different points of view, and through a familiarity with examples from the forefront of knowledge. It is not of course necessary for one to be engaged in research in order to bring this kind of excitement to one's students. Any good teacher will be aware of what is going on in some research areas, even if he is no longer an active participant, and will make use of some of the less recondite topics in his teaching.

However, we cannot build a coherent set of lectures entirely, or even largely, out of such topics. What then can the teacher do from day to day to maintain the interest of his students when he is, of necessity, teaching far from the frontiers of physical knowledge? Here it must be recognized that science is not just fresh creation–it is re-creation as well. In the process of understanding, the student must to some degree repeat the process of discovery. Every student should be taught physics as though the ideas being presented to him are new ones–as indeed they are to him. He should be given the opportunity of sharing the excitement of discovery through rediscovery of the concepts, and reworking of their applications. Carefully chosen problems seem to me to be essential for the learning of physics, not only because of the practice they provide in applying principles, but even more because they help convey to the student some of the thrill of discovery.

This idea has been put very well by Bronowski in a little book called *Science and Human Values*. In discussing the creative process in science and poetry he writes:* "[In] the act of creation, . . . an original thought is born, and it is the same act in original science and original art. But it is not therefore the monopoly of the man who wrote the poem or made this discovery . . . The poem or the discovery exists in two moments of vision: the moment of appreciation as much as that of creation; for the appreciator must see the movement, wake to the echo which was started in the creation of the work. In the moment of appreciation . . . we re-enact the creative act, and we ourselves make the discovery again . . . We are moved by the poem, we follow the theorem because in them we discover again and seize the likeness which their creator first seized."

Whether the teacher is lecturing on contemporary progress in physics or re-creating with his students the discoveries of earlier generations, it is of course essential that he adapt his presentation to the needs and abilities of his listeners. The teacher must cultivate a layered mind, and he must be certain that the layer with which he is communicating is at the level of his students' minds at that moment. The presence of higher layers of the mind of the teacher with many cross connections between them, can of itself do no harm

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*J. Bronowski, *Science and Human Values* (New York: Harper and Row, 1959), pp. 31, 35.

and much good. The harm comes when the teacher forgets or ignores the level of his students, and this can happen even with a teacher who has a minimal knowledge of his subject.

Good teaching, like most other worthwhile activities, thrives in an atmosphere in which it is respected. It is up to all of us to create and maintain such an atmosphere: through self-appraisal, and through encouragement and friendly criticism of younger colleagues. Standards of education are rising steadily, and the number of excellent students in each class is increasing. We must see that they get the very best teaching that we can offer.

July 2, 1969

To the SES Steering Committee:

Writing this was one of the hardest jobs I ever undertook. Over my shoulder I heard hundreds of students saying, “What’s the point–teachers are irrelevant.” But–I fought my way through. If you want to throw it in the fire, that’s all right with me; the style is so wooden, it ought to make a nice blaze.

DICK SCOWCROFT

Teaching Creative Writing

Richard Scowcroft
English

A criticism frequently made against teachers of the writing of poetry and fiction is that they create imitators of themselves. Examples can be found to substantiate the claim and to make uneasy any teacher who does not believe that the goal of his teaching is to create imitators of anyone. No one more than the writing teacher has the obligation–and the difficulty–of helping a student to find and be himself.

In a writing course, there is no body of information which, communicated and mastered, furnishes the content or end of the course. A large body of tradition, yes. Numberless examples of how writers dealt with their own problems of literary creation. Even, to a certain extent, principles derived from the past that may be of use in the present. But no neat compendium of fact or figure that allows the writing teacher to say, “Learn this and you can write a story.” For, dreary platitude though it be, it is nonetheless true that every serious attempt at writing a story involves problems which might be illuminated by tradition and example and principle, but which can be solved only in terms of the inner necessity of the present piece of work. And if the mind sometimes flounders over the inner necessity of one’s own work, how is it to detect the inner necessity of someone else’s?

For many years at Stanford, all of our writing teachers have been writers themselves. Apart from the obvious advantages of knowledge and experience, what they bring to the classroom, it seems to me, is special training in submission to the demands of the created object. That is, they have learned that writing is not random self-expression but truth to the concept of the thing they are making. Confronted with an imperfect piece of student writing, they are apt to have the ability to refrain from re-writing it in their own image and to search (help the student search) for the form, the language, the action which will say what the story itself wants to say. The critical process involved at this stage is not one of describing and evaluating a fixed object but of immersing oneself in a process of becoming, of temporarily dissociating oneself from one's own identity so that one can consider the problem not of how would *I* have written this story, but how should the story have written itself. The result for the student is very frequently an exploration of his mind, feelings, insights, and intentions that yields surprising truths: the story he has written may not be at all the story he thought he was writing. Or, within the words on the paper might be a story he never knew was there. The self-scrutiny imposed upon the student, the necessity for precise judgment and decision are two of the reasons why a writing class can be valuable for a student even though he lack the ability and drive that could eventually make him a "writer."

But as the method of writing is more than self-expression, so is its goal more than self-discovery. The teacher of writing is there as the representative of Art, and although what that means is arguable, one thing it means is that he can say to the student, "What's good enough for your roommate isn't necessarily good enough for me." Although I do not believe that some techniques are better than others, I think it demonstrable that under particular conditions, some work better than others. Although I do not believe that "form" is a thing to be learned and imposed upon writing, I think it demonstrable that if a piece of writing does not achieve its own inherent form, it is to some extent less adequate in communication. And I think students can be shown that if they begin with trivial or false assumptions, it is not surprising that their writing is trivial or false.

One problem, so vague that I'd like to avoid it, is so important that I cannot. This concerns what I shall call, inadequately, atmosphere of the class. Every writer has to discover those particular areas of experience that are his to write about. Very few students–even the talented ones–have made this discovery. And so they imitate Faulkner or they flounder around in experiences that they can neither feel nor understand nor communicate. There are gimmicks–certain kinds of assignments–that may guide the student in the right direction, but more important, I believe, is the creation of a context in which the student works, the presence of certain unspoken assumptions, which the student recognizes and accepts. He has to know, without being told, that writing is of such high seriousness that dishonesty, pretense, self-delusion cannot be tolerated; he has to feel free to write anything except what he knows isn't his best; he needs to be ashamed not of the unsuccessful story but of the shoddy story.

Teaching writing has, I believe, affected my teaching of literature so that even with a body of knowledge to communicate and a class of seventy to listen, I tend to carry over to my novelists some of the same attitudes I hold toward my writing students. Behind *Pride and Prejudice*, I see a pile of blank pages and a young woman who had to fill them up and make infinite choices and discoveries and decisions until she made the near-perfect thing that we can describe and analyze and evaluate as if it had come full-blown and instantaneous from her mind. The proper kind of writing class, far from reducing literature to a study of mechanics, enhances the sense of awe and wonder at its achievements.

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Why College?

Hugh H. Skilling
Electrical Engineering

Sometimes I say to myself, "What is college for, anyway?" and what I reply to myself depends on how I happen to be feeling at the moment. Sometimes I tell myself that college is a sieve, no more; it brings the brighter ones to the top and lets the dimmer ones out the bottom.

In more hopeful moments I tell myself that one surely must learn a little of something at college. Lectures and textbooks are so devoted to facts and information that a bit must stick in the mind, and some even be useful.

At other times it seems to me that broad concepts will eventually prove more valuable than precise information. He is a rare man who opens a totally new area for himself without guidance, and if the college will tell the student what is important, he can gather the detailed facts from a book whenever he wishes.

At my most optimistic I like to think of all that is learned through the friendships and associations of college life. The students work and play with each other in an atmosphere of learning. They come to know and may even come to like the faculty. At their adolescent age, far more is learned from association and emulation than by precept.

This is a happy thought. Of course a college can provide associations with other fine young men and women, a value of college that is totally absent in study at home. It can promote a love of wit and laughter. Good habits can be encouraged. Perhaps even the habit of learning can itself be developed, and one can come to approach a problem with the fruitful view that a bit of study and thought may be productive, rather than taking the barren view that here is something unknown that had best be avoided. One can learn to think before taking action, to look at all aspects of a problem before committing one's self.

College life can be full of good habits. One can learn tolerance, thoughtfulness, decency, punctuality, cleanliness, neatness, and consideration. This is such a happy thought–and then I look around me and I wonder. I wonder at some of the faculty and at some of the so-called students.

No, I do not really wonder. I simply give up that high hope for the present and consider something a notch lower. I turn to the broad concepts to which a student may be guided.

The student will, we hope, be in college for a purpose. He wants to learn what will help him to become a doctor, a teacher, a lawyer, a scientist, a writer, an engineer. It would be nice to learn everything, but since this is impossible he must look to the faculty for guidance. It is the responsibility of the teacher to see that he does not miss completely some essential ideas. The student who reads at home might become so engrossed in chemistry that he would miss even the essentials of economics, or so excited by network theory that he would be handicapped by a lack of understanding of electromagnetic fields.

Does the university give this kind of guidance, I ask myself. Does the history student see the wonderful things that mathematics can do, or the mathematics student learn a little perspective from history? On the whole I continue to hope so.

But surely the classrooms must be brilliant with factual information. Textbooks and lectures are full of knowledge. This is surely true, and when I tend to doubt it I have only to think of a former student who wrote back to me, after having held a job for a year or two, "Sometimes I even find that I can use something that I learned at Stanford." I must admit that I have had such a report only once, and perhaps others have found that what you need on the job you learn on the job, or by study from books. Edward Gibbon, known for that most erudite *Decline and Fall*, took the negative view, and left Oxford after a short stay because so much time was wasted there and his scholarly interests were stultified.

I must admit to myself that the delightful, interesting, and valuable things that come from books can be learned from a book at home as well as from a book at college, and that correspondence schools are highly effective in their way. I remark to myself that lectures became obsolete when the printing press was invented, and that a revision of certain classroom procedures is therefore about five hundred years overdue. But then I cheer myself by remembering that learning at college seems to require less effort than learning at home, perhaps because the spirit of learning is in the air and everyone is doing it, or because the personal presence of an actual teacher exerts some sense of drive or urgency. So, unless I am feeling unusually pessimistic I can convince myself that college teaching is often effective in imparting information.

Should I be feeling so low that I doubt even this (and I am sure that I do not often descend to such a level), then there remains the business of admitting, screening, and certifying; so uninspiring but so valuable to post-graduate schools and to future employers. A while ago I spent a year at Cambridge University, for I had admired their graduates and I wanted to see Cambridge in action. I learned their secret. Cambridge produces good men because they attract good boys. I found no magic to make intelligent men out of dull boys. Stanford, too, I am sure, hopes to attract and later to graduate only the kind of young men and women whom Stanford can be proud to have as alumni, and a Stanford diploma does, indeed, signify something.

If I ever work my way down to thinking that screening and certifying are about all a college achieves, I am really feeling pretty depressed. However, there is one stage lower. We sometimes hear that schools have a custodial function, a sort of babysitting operation. If this ever comes to be spoken of seriously as a function of colleges I shall be utterly discouraged. Yet we come perilously near it sometimes, and when high school graduates go to college just because it is the thing to do, just because the Joneses are going, or just because there is no job for an eighteen-year-old, then I shall know that we have gone too far. Then I shall urge that every true college carve over its gate, "This is a place of learning," and that some other place down the street put up a sign saying, "This is a place to raise hell if you don't know what else to do," and thus all the boys and girls from high school will be provided for in one way or another.

In conclusion, then I shall not even mention a custodial operation in suggesting what a college can well do. Let us rather say that on the lowest level a college can screen and certify. Next, it can perhaps impart information a little more easily than could be done by study at home. Then it can hopefully open valuable or delightful vistas ahead of young scholars. Finally I should like to add that a college is uniquely able to teach by association and by emulation the fine ways of scholarship and the cheerful amenities of civilized life; and if this now seems to be an ideal from the past, perhaps it may also be suggested as a hope for the future.

Teaching and Learning Anthropology

George D. Spindler
Anthropology

Anthropologists agree that they want to communicate a point of view rather than any particular body of data. Specific cases and problems are regarded simply as media for the expression and transplantation of the anthropological point of view applied to the observation and interpretation of human behavior. Although anthropologists do not regard facts as having merit in themselves, they insist upon empirical references on all issues.

A humanistic emphasis clearly dominates the purposes of many anthropologists in their introductory teaching. It seems that anthropologists are more humanistically oriented in their introductory course than in their advanced courses or in their professional research. Even our most "tough-minded" colleagues turn humanistic in purpose, though not necessarily in method, in the beginning course. We have noted the same trend when anthropologists address themselves to the lay public. Perhaps when the image of anthropology is shaped for non-anthropologists we penetrate to the most fundamental values of our discipline.

If we focus upon that portion of the introductory course concerned with cultural anthropology, irrespective of its place in the total sequence or the amount of time that may be devoted to it, we find several different models for the organization of subject matter.

The organizational type I wish to present and defend I will term the inductive-case-study approach. Culture case studies selected for their representation of cultural types are presented to the student in a variety of ways. These culture cases may be described orally, films may be run, records and tapes used. In this presentation the goal is to communicate to the student a complex, lively picture of a whole way of life. And this picture cannot be entirely cognitive, because no way of life is wholly cognitive. The material must have some *emotional* impact. The student must feel as well as think in order to understand any culture case. Vivid, dramatized presentations are in order. Films and records or tapes become particularly important. Well-written treatments of whole cultures are very important.

But these case studies must be given significance. Though the understanding acquired of several culture cases, without generalization or systematic conceptualization, will sometimes automatically cause more or less valid inferences to be produced in the student's mind—he should have some help. But this help proceeds inductively. As the student's exposure to cultural diversity grows he can be helped to group the facts and impressions he has received into a coherent cognitive structure. Rather than starting with the generalizations as a finished product the very important illusion is maintained that both student and teacher start with facts and shared experience. To be sure, the teacher has a structure in mind, so from his viewpoint the actual process of presentation and analysis is partly deductive. He has selected beforehand his culture cases with generalizations in mind that he wishes to reach inductively with the student. But this is the nature of the teacher's role—to withhold and inform; to help the student do what he, the teacher, has already done; to re-create experience; not pre-digest and encapsulate it. Teachers who elect this organizational approach must be prepared for certain hardships. Confusion grows as the diversity of cases presented increases and the tigh con-ceptual organization usually imposed on subject matter in univer and college courses fails to materialize. Students are not accustomed to doing inductive reasoning. They have been presented with the neatly packaged consumer goods of standardized courses too often. Confusion continues until a certain point is reached where the accumulating generalizations and understandings begin to make the still-coming culture cases comprehensible. Then enthusiasm and interest mount rapidly and many students preserve their sense of discovery within a framework of developing analytic powers to the end of the course.

As such an approach must actually be implemented in the classroom or lecture hall, the teacher is necessarily eclectic in his use of methods and techniques. He assumes that one does not teach a student how to think about behavior and process by simply telling him what he, the teacher, has already decided as the result of his own thinking (or that of his preceptors). He assumes that a student must learn how to think by experiencing the process of thinking. Therefore he tries to re-create for each new crop of students the vital conditions of learning—new stimuli, guidance to their understanding, and the atmosphere of experiment.

He also assumes that learning, at least learning about human cultures, must occur empathetically and emotionally as well as conceptually or cognitively. Actually the two, the so-called emotional and so-called intellectual, are never separate in any learning. Some students, for example, are learning to dislike anthropology at the same time they are learning the encapsulated facts and abstract concepts of anthropology.

Because the instructor makes these assumptions he centers his course structure on case materials and then gropes, or at least seems to grope, with the students, toward systematized understandings and generalizations. This groping is inductive because the facts and experience of facts are antecedent to generalization, not subsequent. But the teacher must actually be deductive at times, when he searches back into the accumulated cases for support for an emerging generalization. And his criteria for what it is important to arrive at in the grouping of materials and inferences into generalizations must be derived in part from his own systematized conceptualization of the field, and in part from his own intuitive feel for the facts—for the stuff of culture and human behavior.

This pre-set order is fully as important with an inductive, case-study-based approach as with any other. The teacher must have a clear, well-organized concept of where he is heading if he is going to take his students over circuitous inductive routes to get there.

What this order will consist of will depend in part upon the individual anthropologist. This ordering should consist of several master or core ideas around which many specific hypotheses and facts may be grouped. These are not topics with finalized content. They are idea-orientations that make it possible to coordinate diverse facts within a flexible framework.

In our particular order the master ideas are the following:

1. The diversity of human cultures.
2. The common denominators of human cultures.
3. Culture as a goal-oriented system.
4. Culture as a system of self-sustaining hypothesis.
5. The transmission of culture to new members of society.
6. The dynamic adaptations of cultures to changing conditions of survival.

Any schematic list of topical areas is likely to communicate little to anyone who is not informed about the specific cases and conceptual content subsumed by the statements. One might ask, for example, "Where is social organization covered?" The answer is that it is covered inductively under all of these headings. Social organization, for example, can be seen as the mechanism by means of which status is symbolized, regularized, and rewarded, and therefore is a part of the material grouped under "culture as a goal-oriented system." It is also a part of the materials relevant to the transmission of culture to new members of the group, since the roles and statuses provided by the social system determine who transmits what aspects of culture to whom with what sanctions.

To an Anonymous Admirer*

Wallace Stegner
English

A few weeks ago I received in the mail a manila envelope marked "Personal." It contained a New Testament, a chemically treated shoe-cloth, and a note, which said that my face, seen in some recent newspaper, showed no happiness, and that poor Mrs. Stanford would writhe in her grave to know what I was teaching those impressionable students—filth, no matter how fine words it was put in. The note was unsigned—one of the things that is always astonishing me is how furtive righteousness can be—but a scrap of scribbled paper explained the reason for the gift package. The New Testament was for my reading and edification, though the implication was surely that it would do me no good. The shoe rag was for cleaning my mind.

This is delightful, really, and if I had the lady in class I would have to give her high marks for originality and imaginativeness. The shoe rag is a nice touch, and indicates a capacity for poetic metaphor, and the whole package, including the note, makes a concentrated and forceful presentation of a point of view. Art and message are successfully fused. But at the same time I wish the author had not been so modest, for if I knew her name I would write her a return note (returning the shoe rag, which is as good as new) and explaining in self-defense one or two things about classes in creative writing. I do not know precisely which abominations she has in mind, but I would like to tell her that, whatever they are, I do not teach them to the students. I do not, in the sense this woman understands teaching, teach them anything, but if I attempted to communicate abominations, I am pretty sure that within minutes they would be teaching me. The fact is, I by no means fully approve of a lot that my students write and quite a lot that they publish. My disapproval may be of any kind and degree, from a feeling that the writing is clumsy to a certainty that the moral values are corrupt. But whether I disapprove or whether, as sometimes happens, I am enthusiastic, I refuse to take responsibility. A writing student is a free agent, very often a belligerently free agent. Let him take his own responsibility.

Any writer who is also a teacher of writing—and I can hardly think of one who is not—must reveal in the private parlor of his soul the smashed furniture and scarred walls of struggle. As a writer, he probably needs and demands the most absolute liberty of thought, imagination, and language. He wants to be able to question anything and challenge anything, to say whatever he wants in whatever words are appropriate. That, he feels sure, is the only way to make

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the world show its honest face in the mirror he holds up to it. He wants to be able to join Leslie Fiedler in saying "No!" in thunder, and he wants to say the same "No!" to Mr. Fiedler if he feels like doing so. With some temperamental variations, he is likely to subscribe to James Joyce's belief that a civilization is created by its outlaws. "What is Chaos?" asks Stanislaw Lec. "It is the Order destroyed during Creation."

But as a teacher, a member of the Establishment, our man will almost surely find himself forced to inhibit, for students, the full liberty that he insists on for himself. The more rigidly he holds his own ideas, the less willing he will be to countenance heresy from some brash undergraduate, however talented. But the students most worth his time are those most likely to assert their right to the unorthodoxies of genius. They too will want to question and doubt anything, including teacher, the traditions of language and literary form, and the customary canons of morality and taste; and the frankness with which some of them will choose to present decadent, sexual, and other suppressed matters is calculated to bring cold sweat to the brows of the godly. Far from wholeheartedly admiring the outlawry that crops up in his classes, any teacher of writing will sometimes find it exasperatingly wrong-headed, and by force or guile will try to control it.

So he may want to revise Joyce's aphorism. In the making of a civilization, or a literature, the outlaw often takes the initiative. But real creation is the product of the tension between the outlaw and the law. If the law is too successful in its policing, nothing results but a tame safety. If the outlaws ride roughshod over the law, the result is an anarchy in which not even the anarchs are safe, and in which nothing is created except confusion.

A creative writing class is an experiment in productive tension. If it works, it functions both as spur and as curb to the individual student. As a group of talented and competitive people, it stimulates, or should stimulate, the individual to shine, to catch attention, to do better than his best. As an informed and sophisticated audience, it can either encourage or discourage; it introduces the indispensable factor of communication into an equation that might otherwise be all self-expression. And the teacher? What is he doing, besides corrupting the young? Nothing? Ah, I thought so.

"Come now, can you really teach creative writing?" asks doubting Thomas, and will not stay for an answer. I would not answer him even if he stayed, for the question is absurd. Of course you can teach creative writing–to people with some talent. You do not expect a track coach to make a dash man out of a two hundred and eighty pound shotputter, but that does not say that he should quit pretending to teach foot-racing. Literature is a highly traditional affair, bound by conventions of literary form, by long accumulations of symbolic communication, by the very patterns of thought and feeling implicit in the structure of the language. The thing called creative writing, which involves not merely a critical understanding of the ways in which literature is made but active practice in making it, has been taught for a half-century in American colleges and is being taught at this hour to maybe a million American students. One gets about as tired of the old question of teachability as of the assumption that one is a Svengali poisoning young minds. Doubting Thomas should direct his questions in another quarter. "How *far* can creative writing be taught?" and "How far *ought* it to be taught?" are questions worth an answer.

One way to teach writing is to tell people how to do it. This is the method we all use on beginners, who come to writing fresh and unjaded, uncommitted to tendencies or fads and with only rudimentary artistic souls. They are a joy to teach because the traditional techniques of poetry or fiction come to them with the shock of revelation. As they begin to catch on to how things are done they are full of excitement and enthusiasm. It does not occur to them to question the instructor's judgment, because he obviously knows so much more than they. In exposing them to good models and uncovering the technical secrets of great writers he can be serenely magisterial, and because he does not expect from beginners more than beginners' work, he can at one and the same time retain his authority as the receptacle of the legitimate, and applaud every student flight, however wild, as a fledgling effort, a promise of things to come.

The most advanced students pose quite a different problem—or at least it seems so to me. All of them are talented, some of them highly talented. Almost all are sophisticated in their knowledge of technique: what seemed exciting to the beginner strikes these as cliché. Many are far enough along to have acquired a personal direction and at least the beginnings of a personal manner. A few are as neurotic as birds trying to nest in a wind tunnel, and their writing can never be considered simply as writing, but must double uneasily as therapy. Some have published enough to think of themselves, almost legitimately, as writers. Their relationship with the teacher is complicated by the fact that they are of a different generation, worked on by different influences and inspired by newer (and to them more exciting) models, some of whom, lost in the odd insider-world of coterie literature, have escaped the eye of the teacher altogether.

Does he tell these people how to do it? There are those who do. If he elects to, he has to assume that he *knows* how to do it, and this implies that he has rationalized his own practice into a law of the universe. He risks driving away all those students who are most rebellious and revolutionary in their values and their methods, and he risks turning those who submit into highly polished duplicates. Robert Frost was thinking of this kind of teaching, though not in connection with creative writing, when he made his joke about the big Kittredge and all the little ca'tridges. Originality, under this sytem, can consist of no more than very slight variations within the traditional forms and within a traditional structure of ideas. The system confines itself not merely to what is known, but to what has proved itself compatible with the ideas of the teacher. It has the great advantage of precision and definiteness and authority, and it keeps the teacher where a lot of teachers want to be—in charge. Any teacher knows, as most of his students do not, how little the literary revolutions actually overthrow. They stir the surface as a typhoon stirs the surface water above the Mindanao Deep, and when they have wrought all the changes they aim at, they leave the depths pretty much untroubled. On the other hand, those depths can only be peered into from the surface; and a dead calm, however serene or ominous, is not the only aspect the surface can take. To demand submission to any collection of eternal literary verities is equivalent to forcing all students in an art class to paint like Quattrocento Florentines.

The exactly opposite course is open. A teacher may so far efface himself as to be only a master of ceremonies whose opinion is no more to be valued than that of any student. Since there is no doctrine *ex cathedra*, anything goes. Anything its author takes seriously, the class will take seriously. Nobody has any right to say "This is nonsense," because the territory of sense is not defined. To a charge of nonsense, the author is entitled to say, "This is the way I want it. It says what I want it to say. How do you know it's nonsense when you can't even understand it?" In a completely permissive atmosphere, which I think can never exist, there is no answer. The outlaw temperament has found the total freedom that it desires, and the result is anarchy. Unless some standard of intelligibility, form, vividness, reticence, and communication is held against the idiosyncratic expressionism of some kinds of student writers, no teaching takes place, and no learning either.

When the verities are held, not too hard, against the whirl of novelty and experiment, there is creative tension. Something happens: an edge. The good writing classes I have listened to or participated in have suggested well-defined standards without enforcing them, have given anything a hearing and a chance to prove itself, have withheld judgment until judgment seemed to grow from the class itself. It is a socratic method, and excruciatingly difficult; it works perhaps a quarter of the time, and with some students never, and with others not until after a delay of years. It is very like training a high-spirited colt. You start him running, but with a rope on him; and when you lesson him you do not yank his head off, but exert pressure. Or you permit the mere weight of the rope, which is like the unforced reaction of the class, to keep the wild one from bolting through the fence. Which is to say that the teacher more often than not is merely sitting there, saying little, acting his role of the Nemesis of the traditional. He has hold of the rope, and the colt runs around him, and the drag is circular and centrifugal.

This is the ideal. It does not work ideally too often, and when it does not work, a two-hour session of it can leave the teacher feeling as if he had been carrying the whole class on his back for the full hundred and twenty minutes. Nobody assumes that a quarter of it or a year of it tames a really wild one fully, and nobody denies that some students tame too easily and never become anything but plugs. Nobody denies that there is a large proportion of trial and error, waste motion, tedium. One listens patiently to things that by any standard are trivial, inane, compulsive, pretentious, obscene, or utterly mad, and one does so for only one reason: that out of this nettle danger we *do* pluck this flower safety; that out of the outlaw exuberance and rebellion of young writers comes every new insight, every slight change, that keeps literature alive and in touch with the changing surface of experience.

At its best, this is the most rewarding teaching I know anything about, because one has not merely retailed his hoard of historical and technical lore, but has assisted in the active making of something new. Nevertheless I insist that the teacher has no responsibility for the product unless he has enforced his standards upon his student—and in that case he has not been teaching *creative* writing at all. He has never got to the point of seeing the colt go cantering around the ring without a rope on him.

On Teaching

Mary V. Sunseri
Mathematics

It has been said that every generation has been a period of agitation in educational matters. It is unfortunate that at times so little is remembered that we often feel that the past had no problems. Perhaps on the one hand this is good as it forces us into action. On the other hand we may lose the idea of perspective. The good teacher will make an effort to keep informed and use the best in the way of improvement that the past and present have to offer. One should not dismiss any idea of change as part of a chronic movement. I would consider it good judgment to remember that the old is not all bad, and the new is not all good.

In considering a question like the teaching of mathematics, we find ourselves in the middle of the typical conflict between the past and present. In general much of what applies to the teaching of a mathematics class applies to other classes. The subject matter should be improved in such a way as not to destroy the student's interest. One should try to conserve the best of the old and screen carefully and use the best of the new. It is necessary to preserve the simplicity of treatment and clearness of expression. Enthusiasm as well as knowledge is needed. Continuity of thought is also important.

I do not believe that definite rules can be given for the detailed handling of a class in any subject. If this were done, one would lose the personality of the teacher, the originality, and the spontaneous response of the class. The result would be a very dull session. There might be some agreement on certain general principles. Probably no two teachers would use them even approximately in the same way.

Teachers must be supersalesmen. They need to appreciate different levels of ability and be alert to the needs of their students and take steps to meet these needs. Encouragement of every effort is important. This calls for a genuine desire to help. One should encourage investigation rather than demand just stated facts. Learning is a two-way affair. One must not only receive instruction but must study actively for himself. Students should be encouraged to express themselves freely but at the same time correctly.

Teachers need a good sense of humor. They should enjoy teaching. Otherwise it could become a burdensome chore. Enjoyment is contagious. Lack of it is often reflected in the students.

In a mathematics class as in other classes, it is not unusual to hear the question, "What is the use of it all?" I am reminded how far materialism has gone. I hope that there are some who will desire to study some mathematics and read some mathematical literature because of the pleasure derived from such study and reading.

Briefly, I would like to help develop in the student:

1. A degree of interest in mathematics, which will encourage him in the study. I hope that I can make the material in my courses not only more intelligible to the student but also more interesting and stimulating.
2. Self-confidence in studying mathematics and in problem solving.
3. The desire to make precise statements.
4. The desire for thoroughness and clearness.
5. The desire to think logically. The power to analyze a new situation and reason out the solution.
6. Attitude of inquiry and desire to make discoveries.

I suspect much of this has already been said. Unfortunately, in order to cover the required material, I often sacrifice some of the better methods of handling a class. Hopefully, with experience it will get better. Good teaching is vital. It does not just happen. It is planned.

Some Thoughts on Teaching in the University

Norman K. Wessells
Biology

I suppose that if I could do only one thing for students, it would be to instill in them an appreciation of the beauty of living things and of the life process. An appreciation based upon knowledge and upon awareness of the incredible intricacies of life is the kind I mean; not an appreciation in the form of awe or wonder based on ignorance and mere sensory awareness. I seek to get the student to the point where a set of facts suddenly gel for him–the pieces fit together, and, on his own, he truly understands *why* some part of life is as it is. This gelling, this sudden insight, is a unique kind of pleasure that is truly thrilling, and it can come only from the intellectual effort, from reasoning and rigorous thought. If it can be achieved, then curiosity to know more, to have a larger world in which the "why's" have answers, will surely follow. If such a state is reached by a student, then teaching for me has been successful.

How does one go about that kind of science teaching, when each student is only one among hundreds of faces in a class? I begin with the assumption that the lecture, as we know it, can be a vehicle for personal communication between teacher and individual student. For this to be true, above all the lecturer must come across as a person who deserves the respect of the student. He must be honest, candid, always open to question, unafraid to admit ignorance or a mistake, and he must never take himself too seriously. What he must take seriously and must project to his students is respect for the truth and for the intellectual process that is our means to knowledge.

But those things are only techniques and are only of use if the lecturer has one crucial capacity: that is, the ability to present a unique, personal view of a topic in a way that reaches the student. As scholars engaged in research, science faculty continually deal with the personal approach to a discipline. That is the way that we explain our experiments to our peers. In writing a technical paper we select some small group of facts to set the frame of reference that will introduce our work, and then discuss another set that amplifies our results to explain their significance. The same kind of operation must be carried out by a teacher, but the task is much more difficult because the mass of facts that must be culled is so much larger and because the recipient of the information–the student–is a novice in the field. Just as different scientists have varying capacity to explain their work to others, so they have varying ability to perform this distillation and interpretation for students.

But that is the capacity that they must develop if they are to be great teachers. They must provide orientation in a world of vast numbers of facts. They must select, arrange in logical relationship, and present in a clear, simplified way, the story the facts tell. The essence of university-level teaching is this process. The choice of what is important enough to be taught, the frame into which those facts are placed, and the drawing of generalities for the student are the crucial ingredients for the great lecturer.

This process is what distinguishes the true university teacher from a college teacher. The latter, for diverse reasons, is often forced to teach someone else's interpretation of the facts. It is second-hand teaching, and it includes many dangers. The great teacher cannot function that way. He must go to the sources—the facts themselves—understand them, fit them together, and present his view of what their pattern means to his students.

Here in is the reason why I believe that the very best teachers are continuously engaged in research activity. Research requires the scientist to know what is going on in his field and what new facts are being added to the store of knowledge. To do his research he must read, discuss, relate the new to the old. Those are the very processes that must go on in preparation for teaching. One's previous judgments must continually be re-examined, modified, and rephrased so that the student is given the best possible view of the subject. From what I have seen, most of us simply do not have the self-discipline required to remain "up" on a field, year after year, unless we have the stimulus of continuing to contribute to the field. Hence, I view research as essential to the most important aspect of teaching, the interpretive process for students.

There are other advantages linking research and teaching in one person. The very preparations one goes through for teaching are the keenest knives for honing one's research. Being forced to think about the whole picture so that its essential elements can be transmitted to the student, is an enlightening, and sometimes sobering, experience in judging one's own research efforts. Without teaching, it is too easy to slip into the pell-mell race that leads from one experiment to the next, most often without the pause that gives perspective. Hence, I argue that our research profits greatly from teaching, just as great teaching requires the research atmosphere of skepticism and search for more complete knowledge.

Teaching and Research

Report of the
Steering Committee

One of the most prominent themes in the foregoing essays on teaching is the concept of self-motivated, life-long learning on the part of the faculty. We believe the faculty is committed to this concept, though as we noted in the introduction, there are pressures and constraints that frustrate their attempts to follow this commitment. We turn now to a brief enumeration of these pressures.

1. Curricular pressures. A professor is frequently asked to teach a variety of subjects within his discipline, using imposed instructional formats and addressing a wide range of student interests and abilities. These subjects may be more or less consonant with the professor's own intellectual interests in his discipline. Clearly poor teaching can result from this situation. Less emphasis on required coverage of course topics would usefully modify this constraint.

2. The potential dichotomy of teaching and research. The faculty recognizes the essential connection that exists between good teaching and continued learning. Continued learning, however, usually requires that the professor be actively engaged in research; and high quality research demands both extended concentration and intellectual creativity. Thus teaching and research are in competition for a faculty member's time and interest, as are a growing number of other University obligations. The consequences of this competition are perhaps less evident at the graduate level than at the undergraduate level, though they are certainly identifiable at both.

The conclusion that is frequently drawn from these observations is that teaching and research are incompatible. Such statements, however, are usually based on personal observations or subjective judgments. We find no substantial basis for this conclusion in the foregoing essays, nor from two recent studies undertaken by the Subcommittee on Teaching and Research, which showed no negative relationship between teaching effectiveness and research activity. One of them in fact showed a positive relationship between the two. We therefore do not agree with those who claim that teaching and research are incompatible, though we do see a need for a reorientation of the system of expectations and rewards so that imbalance is discouraged.

3. The publication problem. Good research warrants, indeed demands, presentation and publication. Publication can therefore be used as the certification of good research and thus becomes an important criterion for promotion at the University. Certainly high quality research is a proper criterion to be used in judging an individual's contribution to the life of the University. However, there are brilliant teachers who continue to learn and to think creatively but who do not publish regularly. We believe the University should exercise the critical judgment necessary to evaluate intellectual vigor and creativity independently of the volume of publication. In particular a man who continues to learn and to teach well should be evaluated positively on the basis of what he has done, not on the basis of what he has not. We therefore recommend a number of ways to present information on teaching ability to those governing appointments and promotions. This, as we shall demonstrate, is as the faculty would like it to be. Our first obligation is to provide for the gathering of data that will measure teaching effectiveness and that will at the same time give evidence of the importance of teaching in the University reward structure.

4. Professional pressures. There is a growing dependence of industry and government on faculty members for consultation and research. This activity has resulted in new pressures on the faculty, in the sense that rewards accrue to the faculty member for his outside services. The increased mobility of faculty members has also led, in some cases, to a shift in allegiance from their institutions, where they may not remain very long, to their professions. Finally, the need for nationally recognized criteria to evaluate professors at distant institutions has also led to an increased emphasis on the importance of research and publication as criteria for evaluation and promotion on university faculties. A professor's commitment to teaching can clearly suffer under the influence of these factors.

5. The complicating influence of tenure. The problematic aspect of these pressures is further aggravated by the academically sacred institution of tenure. Although it effectively guarantees freedom of speech and inquiry, tenure also produces the undesirable side effect of locking into the highest levels of the educational system some faculty members whose intellectual interests have withered. There is no way, either forcefully or gracefully, to bring about the retirement or reassignment of a no longer stimulating professor. Therefore, those who have the power to grant tenure are plagued by the fear of making a mistake for which they, their departments, and their students may suffer far into the future. Once a tenure position is filled, of course, no one else, no matter how desirable, can be hired with those funds since they are committed until the occupant's retirement.

Under the current conditions of supply and demand, tenure does nothing to retain those men a university really wants to keep. The best professors at a good university could have a dozen offers at the slightest hint that they wish to leave, whereas tenure guarantees that the weakest members of the faculty will never leave. We see no realistic remdy to these problems since the shortcomings we have noted are overbalanced by the value of tenure as a protector of academic freedom.[1]

Faculty Perceptions of the Relative Importance of Teaching and Research

To determine the effect of the pressures described above, a representative sample of 100 Humanities and Science faculty members were interviewed.

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[1] One interesting and ingenious suggestion for relieving the tenure situation that has been suggested to us, although it is far too costly for current implementation, is a plan to lower the standard University retirement age drastically, say to 50. It would then be the norm to retire at this age, perhaps with half-maximum salary. The retired professor would be free to take another job, either at a different educational institution or perhaps in an entirely new vocation. One outcome might be a redistribution of talent to other, possibly less well-endowed, institutions. A small number of the most intellectually active and continuingly creative professors would be asked to remain at their posts by their younger colleagues. This would be a rare honor, giving strong testimony to their ability as outstanding scholars and teachers. Students and younger faculty could well play a prominent role in these appointments. Such a plan would benefit both students and faculty by providing a gracious way to clear away the dead wood, which inevitably accumulates in the academic grove, while simultaneously honoring and retaining the most outstanding of the senior faculty.

They indicated that they believe their University rewards to be far more dependent upon the evaluation of their research and scholarship than upon the evaluation of their classroom teaching (see pp. 128–133, in Appendix 1). However these same faculty members also believe that much more nearly equal weight should be given to evaluation of their teaching and their research in determination of University rewards. The survey shows in addition that those faculty members who perceive teaching as a relatively more important determinant of University rewards tend to devote significantly more of their time to teaching.

If these findings are valid for the entire faculty, then what is desired are measures to bring the University reward structure into better balance. It seems highly unlikely that the faculty, which must in the final analysis enact or endorse whatever changes are made, would choose to reduce Stanford's heavy involvement in research in order to improve teaching. However, according to our findings, they should welcome increased recognition and reward for teaching. It is toward such a change that our recommendations on teaching are directed.

The conclusion of the present study and the inauguration of a new University administration provides a propitious time for the faculty to reaffirm some basic principles. We therefore recommend that:

1. The faculty of Stanford University should explicitly assert its interest in the improvement of teaching and learning processes and should give substance to this assertion in every possible way. In particular, the University faculty should:

a. Formally recognize that faculty appointments in all schools and departments offering instruction require a commitment to teaching and a reasonable degree of proficiency in it, realizing that teaching needs and styles differ in different schools but recognizing that they are present everywhere in the University.

b. Formally affirm that during each academic year, except when on leave or primarily involved in administrative duties, every member of the faculty should be involved in some form of undergraduate and/or graduate teaching, by presenting courses, by involving students in their research, or by supervising independent work.

c. Recognize that the faculties of schools offering both undergraduate and graduate degree programs are single entities, not separable into graduate and undergraduate faculties.

d. Encourage the participation, wherever resources allow it, of the faculties of the graduate professional schools in undergraduate instruction.

This recommendation does not imply a change in existing goals and objectives. Their affirmation at this time should, however, strengthen a determination to meet current educational demands and provide concrete guidelines for developing or preserving policies that recognize the transmission of knowledge as a primary University function.

Teaching and Faculty Evaluation

As noted earlier, faculty members themselves would prefer an increase in the influence of teaching in the determination of University rewards, most notably promotion. To accomplish this desirable objective, we recommend that:

2. Each entity responsible for recommending or reviewing academic promotion and appointments should recognize the teaching role of the University by giving significant weight to a candidate's commitment to teaching and his teaching skills and style. Candidates should be made well aware that evaluations of their teaching will be taken into account by promotion committees.

Among the items of evidence that should be considered are 1) the data of carefully conceived and executed student ratings (see Recommendation 8); 2) the results of any confidential survey of a professor's teaching effectiveness conducted at his own request (see Recommendation 9); 3) carefully formulated expressions of opinion from groups of students, graduate or undergraduate, who have studied under or taught with the candidate; 4) the results of observations by experienced faculty of lectures, seminars, and discussions conducted by the candidate; 5) the willingness and ability of the candidate to advise and supervise both undergraduate and graduate students; 6) established capacity for educational innovation, as shown, for example, by the development of new courses or instructional methods; and 7) student membership on faculty committees determining promotions and appointments, a practice recently established in some departments.

Recommendations to promote the availability and reliability of evidence as proposed in 1) and 2) will be made separately. Proposal 3) above is illustrated by a promising new channel of communication devised by the English Department and its students. A graduate student group within the Department, the English Review Club, is notified whenever a department member is being considered for promotion or reappointment. The club then gathers opinions from those graduate students who have studied under or taught with the candidate for promotion. These students present a written statement to the Department Chairman, who in turn submits this evidence to the promotion committee. After the decision of the committee, an official statement concerning its decision is sent back to the club. This type of formal input of student opinion is a model that we believe is widely applicable and that could be very influential in increasing the recognition given to good teaching without in any way binding the decision of the departments. The additional step taken by some departments, notably English and Biology, of including a student on their faculty promotion committee, is another approach to getting student input for these decisions.

We believe that proposal 4) above has demonstrated promise. Very few professors, let alone department chairmen, have audited the classroom performance of the faculty in their departments—although we know of instances in which observation of teaching is standard practice—whereas the good and bad aspects of a colleague's research are exhaustingly discussed and debated. Surely experienced and responsible faculty members should be giving similar attention to their colleague's teaching abilities. This procedure should be no less acceptable than analyzing and criticizing a colleague's research or scholarly output. We are convinced that direct evaluation by peers, or at least departmental chairmen or their delegates, should be an important source of information for promotion committees. When an appointment is being made from outside our own faculty, the problems of evaluating the candidate's teaching ability are far greater, but nonetheless data on teaching should be actively sought.

In the area of maintaining high standards of teaching performance we believe it would be desirable for the Dean of Undergraduate Studies[2] as the prime advocate of undergraduate interests, to have a say in appointments and promotions. At the very least he should be privileged to have his views recorded and transmitted to the President and the Advisory Board. We would prefer his active participation in the review of all promotions involving teachers of predominantly undergraduate subjects, either as a member of an *ad hoc* review committee or of the school-level committee concerned with appointments and promotions. We recommend that:

3. The Dean of Undergraduate Studies should be a member of the committee charged with final deliberation on, and approval of appointment or promotion of faculty members who will teach undergraduates.

[2] See SES Reports II and X.

Matters for Departmental Consideration

In our Reports I and II we stressed the importance of permitting professors to teach what they want to teach. Such a practice ordinarily permits a closer conjunction between a faculty member's research and his teaching, to the benefit of both. It is especially valuable to junior faculty who are under unusual pressure to excel at both. But unfortunately the practice of assigning younger teachers to large introductory courses with pre-determined syllabi lingers. We would rather see such courses draw upon the latent generalist tendencies of more senior faculty who have had the time to develop a broad view of the topic. Exposure of beginning students to the established luminaries of the field has its own obvious advantages for student and department alike. We therefore recommend that:

4. Whenever possible, departments should assign junior faculty members to teach courses in the area of their special interests and strive to have introductory general courses offered by senior faculty.

Creation of New Types of Faculty Positions and Appointments

As has been discussed repeatedly, there is a need to create ways to encourage and reward dedicated and effective teaching in the University. The recent Ford Foundation grant to establish the position of Fellows of the University is just such a mechanism. We heartily concur and recommend that:

5. One of the prime purposes of the Innovation Fund[3] should be to provide funds for released time for faculty members of any rank who present meritorious proposals for new course structures, new academic programs, or other educational innovations. In addition, we recommend that the University seek a permanent endowment for the Innovation Fund so that it can continue to finance innovative educational excellence, especially in the area of teaching.

Such an application of the Innovation Fund, as well as the creation of the position of Fellow of the University, makes it clear by example that exceptionally creative teaching is rewarded.

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[3] See SES Report II, pp. 26–29.

Rewarding individual teachers for excellence is not the entire answer to the problem of improving the prestige of teaching in a university since, as we have noted in surveys of the Stanford faculty, departmental expectations are often perceived as conflicting with individually expressed faculty desires. Some mechanism to reward both the individual *and his department* for exceptional teaching is therefore necessary. One such device is the creation of several new, rotating, endowed, prize fellowships for distinguished teaching. A holder of one of these short-term chairs would receive a salary considerably above the normal level while continuing to carry on his regular work. For the duration of the endowed fellowship, his regular salary would remain within his department's budget, to be spent in whatever manner it chooses: to bring to the University one or several distinguished visiting professors or to buy a particular collection of books or other materials. Thus the faculty member would enjoy the distinction of the award and the added salary, while the department would benefit substantially as well. Such a plan should encourage both individual and departmental enthusiasm for excellent teaching.

There should be active student participation in an all-University internal selection committee for these fellowships. The student voice is entirely appropriate to the nature of the award; in fact the majority of the search committee members might well be undergraduate students. A meaningful program to contemplate would be the awarding of two such endowed fellowships each year for two- or three-year terms.

Such a program would require a sizable endowment. We suspect, however, that its natural appeal and novelty would make it extremely attractive to a donor wishing to do something unique for undergraduate education and teaching. We therefore recommend:

6. The University should establish a number of prize fellowships for distinguished teaching, which would be awarded, for limited periods, to faculty members selected by a student-faculty selection committee for their outstanding contributions as teachers. Fellows would receive the substantial salary provided by the endowment while departments would be free to spend the budgeted salary vacated by the recipient in whatever manner it chose during the term of the appointment. The securing of endowment for such fellowships should be a matter of high priority.

Because of the value of the teaching and research done there, the universities have moved much closer in the last twenty-five years to the seats of power in this country, namely business and government. The exchange of ideas between them, however, has been largely one-directional, from the universities to business and government, usually at the request of the latter for consultation on specific needs. The universities would be much the richer if this flow ran in both directions and if they had a way to benefit from the ideas and experiences of government, industry, and other external agencies as well. There is a wide range of people who, having achieved distinction in affairs beyond the university community, would be a valuable source of ideas and information to their more theoretical academic counterparts, and to the student body. We therefore recommend that:

7. The University should establish the new faculty category of visiting University Professor to be occupied by men and women who have achieved distinction in some non-academic area, such as government or other public service, the professions, the arts, or industry. Appointments would be for fixed short terms, usually not renewable. Selection should be made by a special faculty-student committee of the Academic Senate.

The presence of such persons on the campus, even though their absolute number would be small—perhaps 1 percent of the total faculty—could have a substantial catalytic effect on educational innovation and stimulate students who are designing their own majors. This program offers a chance to bring into the University ideas that often do not penetrate the boundaries of this community.

The Student Course Review

Students at many universities publish course evaluations of varying quality and usefulness. Stanford students have for a number of years published such reviews, known in the idiom of the campus as the "scratch sheet" and usually formally entitled the *Course Review.* The scope and coverage has been variable, as has the quality of the surveys and reporting techniques employed.

It is our opinion that a regularly and responsibly prepared course review would be valuable to students in planning their programs, to advisers in providing guidance, and to others making judgments about faculty teaching performance. The *Yale Course Critique* is a useful model. This student analysis is well conceived, prepared, and edited and enjoys a wide audience among students, faculty, and administrative staff. It was favorably referred to a member of the SES staff by a number of persons from the head of the student academic committee to the Dean of the College. We recommend that:

8. An agency of the student body should devise, produce, and widely distribute a systematic evaluation of courses and instruction including valid empirical measures of student judgments.

The initial maintenance of this project will probably require University subsidy, but the project should ultimately stand on its own merits and be funded through sales.

Proposed University Services in Support of Teaching

While we feel that a student-conducted survey is the principal effective way to get an open, comprehensive picture of both departmental and individual teaching throughout the University, there are other types of evaluation that might be more useful to individual teachers concerned with the quality of their classroom performance. A prototype of such an evaluation procedure has been developed and tested as an SES staff project (see Appendix 2) and Tau Beta Pi has conducted a similar voluntary survey in the School of Engineering for a number of years (see Appendix 3). Such a service should at least be available to interested faculty members with the results made available only to them and their department chairmen on a confidential basis. We recommend that:

9. The Academic Planning Office[4] be responsible for developing, in consultation with faculty members, a diagnostic evaluation questionnaire and for conducting surveys of student opinion on specific courses, at the instructor's request. This service should be routinely available every quarter to all interested faculty members.

There are several reasons why Recommendations 8 and 9 need separate consideration and adoption. When a student course evaluation is used primarily as a diagnostic device to aid instructors in improving their teaching performance, the questions asked are not necessarily identical to those appropriate to a student course review. A teacher who rates as the very best in a University-wide student course review might still be concerned to see if his students believed he could improve in some aspect of his work, a matter quite separate from his relative standing vis-à-vis his colleagues. On the other hand, a voluntary service employed only by those professors already anxious to improve their teaching does nothing to create the pressure for the improvement of teaching, which we think the faculty wants and the University needs.

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[4] See SES Report I, Recommendation 1. Details Appendix 5, pp. 36–38.

The preceding two recommendations would do much to eliminate weaknesses in teaching, but they would do little to suggest specific improvements. Some very good work has been done at Stanford in the School of Education and some Humanities and Science departments (notably Physics) to help teaching assistants develop their style of instruction by recording and subsequently playing back videotapes of classroom presentations. Such self-scrutiny, when accompanied by clinical assistance from trained observers, can do much to eliminate both superficial and fundamental flaws in teaching technique. We recommend that:

10. There should be established a teaching services center to assist interested faculty members and graduate students in the improvement of their teaching by:

a. Providing for videotape recording and analysis of lectures and discussions.

b. Offering seminars and lectures on teaching, testing, and instructional media.

c. Arranging for "clinical" services for individual faculty members.

This proposal expands upon recommendations made in our Report VII, *Graduate Education.*[5] In addition, this center, possibly in cooperation with the School of Education, should investigate the desirability of videotaping some of the finest and most stimulating lectures by our faculty, as a permanent educational resource, available for subject matter learning or for demonstration of effective styles of presentation. Such a practice would require the consent and cooperation of faculty members who would devote the necessary time to edit and refine videotape lectures, as they would a book, until they are satisfied that the style and content are suited for general use.

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[5] See p. 13, Report VII.

Improving the Utilization of Existing University Resources

Despite recent growth in the overall size of the faculty at Stanford we continue to experience a shortage of professional personnel, and faculty members continue to feel desperately short of time (see results of faculty interviews, Appendix 1). The effectiveness of the present faculty members should be optimized by seeing that they do not have to do chores of the type best handled by less costly personnel such as secretaries, computer programmers, departmental expeditors, and so forth. It is false economy for a professor's time to be spent in clerical tasks. We should begin to utilize the devices employed by other professions, such as medicine and law, which have developed specialists to carry out routine functions. Ideally many of these functions could be performed by students whose compensation would be a form of financial aid. Such work would be closer to students' interests than hashing or yard work.

The Committee on Government of the University has recommended in Report X that each department be authorized and budgeted to employ an administrative assistant to handle routine departmental business. We recommend in addition that:

11. Each department should study the cost-effectiveness of employing various types of faculty support personnel to achieve optimum use of faculty time. Student assistants should be employed wherever possible.

Another resource that is available to improve the effectiveness of faculty members consists of experienced and talented members of the University community who are not currently engaged in instruction. Examples of such persons are postdoctoral research associates, certain faculty wives, and emeritus professors, many of whom are well qualified to be effective in such matters as remedial writing, recitation sections, freshman tutorials, and informal seminars. It is, however, essential that assistance of this kind not be regarded as a source of cheap labor that can erode the regular professorial faculty. Three safeguards are clearly necessary: 1) Such persons should be employed only at the instigation of the department or school responsible for instruction, or in the case of freshman tutorials, at the instigation of the responsible committee. 2) Reasonable efforts should be made in advance of employment to see that current standards of instructional quality can be expected to be met, and individuals should be monitored to determine whether or not these expectations are fulfilled. 3) Those persons who are employed full time by the University (for example, postdoctoral research associates) should have an appropriate portion of their salaries assigned to the departmental or school instructional budget.

In summary, we recommend:

12. Attention should be given to the availability of suitably qualified persons in the University community who could teach in a range of undergraduate programs, such as remedial writing, recitation sections, freshman tutorials, and informal seminars. This should be done only at the instigation of the relevant department, school, or committee, and with appropriate budgetary arrangements and safeguards to prevent erosion of quality.

Research

We believe that those who contribute most effectively to the learning of others are those who are themselves actively involved in learning. The customary manifestation of this continuing learning process in the academic world is the scholarly research performed by faculty members. Research grows out of an intrinsic curiosity and desire to learn on the part of the faculty member. Through an involvement with research, the teacher continually renews his interest in and knowledge of his subject and conveys to his students the dynamic character of his discipline. Unfortunately, students sometimes regard scholarly research as an activity that distracts the teacher from teaching, rather than as an essential concomitant to teaching. We therefore urge faculty members to describe their research in terms that can be understood by their students and, especially, to bring the new knowledge found by them and their colleagues into the classroom wherever possible. When students, undergraduate as well as graduate, see how new information and ideas are comprehensible to them, they are more likely to become involved in the scholarly process themselves. We recommend that:

13. Members of the Stanford faculty should devote a substantial effort to making their scholarly research intelligible and interesting to non-specialists, in particular to their students. At the same time, the effort should be made to secure more widespread and active participation by undergraduate students in research activities.

The work of the Subcommittee on Goals and Decision-making Processes generated two interesting proposals for new types of interdisciplinary research and teaching institutes at Stanford. The specific proposals, for an Institute of Urban Affairs and a Center for Environmental Studies, are briefly described in Appendices 4 and 5. The soil and the climate are ripe for these programs to take root at Stanford. There already exist interdisciplinary faculty groups interested in these two areas, and during the current academic year a broadly based, student Population and Environment Forum has been active in bringing speakers to the campus and organizing discussions on many related topics. The primary obstacle to their establishment is financial. The problems to be confronted by these proposals are becoming so acute that the nation will soon need to enlist both the universities and industry on a major scale, if we are to reverse the deterioration of our cities and the environment. Now is the time for preliminary action by Stanford to develop those capabilities that will attract financial support.[6]

These two proposals are not only justified by the needs of society and the interests of the University community, but also by the value of incorporating socially and politically relevant research into the University. Such work would have a beneficial effect on student attitudes toward faculty research. We recommend that:

14. Appropriate agencies of the Academic Senate should consider whether and how an Institute for Urban Studies and a Center for Environmental Studies should be established at Stanford.

Government Supported Research

The first of the subcommittee reports that follow deals in detail with problems deriving from the dominant position of the federal government in financing scientific research. Without it university research would still be in a rudimentary stage. With it researchers are subject to being deflected away from imaginative but speculative work into projects of immediate practical promise; with it also comes artificial and damaging imbalance among disciplines in such things as graduate student and faculty support.

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[6] Three recent curriculum developments should be noted: 1) The Esso Education Foundation recentlyprovided financial support for the development of an interdisciplinary undergraduate course on the problems and issues of urban and regional planning and development, tentatively scheduled for spring quarter 1970. 2) The ASSU Committee on Urban and Environmental Curriculum is proposing a series of three courses for 1969–70. The autumn quarter course, Urban Community Behavior, has been approved as an Undergraduate Special course; approval for the winter and spring courses is pending. 3) Several proposals for multidisciplinary workshops on current social and political issues have been submitted for approval as Undergraduate Special courses for autumn quarter.

We see no alternative to continued heavy reliance on federal funding of research, and we support continued orderly expansion of government sponsorship of research in universities. At the same time we see two major steps that need to be taken to restore better balance in research. The first is to improve our dealings with those government bodies having some responsibility for research support. We therefore recommend that:

15. Stanford seek, alone and in concert with other universities,

a. To gain broad understanding in the government of the nature and needs of research as an integral activity of higher education.

b. To broaden the areas and reorder the priorities of federal research support.

c. To seek to develop among the government agencies policies compatible with University objectives in such matters as funding continuity, publication practices, cost recovery, and so forth.

Initiative in these matters would be a proper responsibility for the Associate Provost for Research, a post now vacant, or a comparable University officer.

The second step we propose is an accelerated effort to seek non-government support for research. Even modest increases would help to restore better balance among disciplines by providing research support in areas where the need for costly equipment is minimal. In all areas free research funds would help the faculty to resist external pressures and encourage younger faculty members to be more independent in following their own interests. Such funds would also free graduate students in their choices of faculty advisers and research projects. We are not so naive as to expect immediate success in raising free funds of this type, but believe it should be a matter of continuing priority in our fund-raising. We recommend that:

16. The University should establish as a long-range and continuing goal the increase of endowment funds available for unrestricted support of faculty and student research.

University Review of Faculty Research

We believe that continuing review of research should be in the hands of a faculty committee. This function has been ably performed by the Committee on Research Policy. Regardless of changes that might take place in the administrative structure for regulating research activity, the responsibility for initiating policy in this area should remain in the hands of a faculty committee. Consistent with our recommendations in Report X, *Government of the University,* administrative officers in the research area should be privy to the work of the committee, but should not be members of it. We recommend that:

17. Research policy should be established by the Academic Senate Committee on Research Policy. The Committee's concern with University research policy should include continuing informational, advisory, and initiatory functions.

a. Its informational functions would require such activities as a study of the ways in which research presently affects teaching, and the diffusion to all interested students and faculty of information about currently available research facilities and support.

b. Its advisory function would include recommending guidelines on such matters as a comprehensive University policy for present institutes or research bodies and the establishment of new ones; for classified research; and for the determination of the proper relation between contract research and the award of higher University degrees. It would not concern itself with such matters as the evaluation or approval of particular research projects or grants or degrees, or with the details of the procurement or allocation of research funds from outside sources.

c. Its initiatory functions would include assuring a high University priority for the provision of research funds and other resources for members of the University who at present lack them, especially graduate students and junior faculty.

Classified Research

The Academic Senate has recently undertaken active review of the University policy concerning classified research at Stanford. This issue had been under considerable discussion by the SES and its Steering Committee. In view of the rapid pace of developments in this area, the Committee has decided to defer to the Senate and to make no further comment on this.

Summary of Recommendations

1. The faculty of Stanford University should explicitly assert its interest in the improvement of teaching and learning processes and should give substance to this assertion in every possible way. In particular, the University faculty should:

   a. Formally recognize that faculty appointments in all schools and departments offering instruction require a commitment to teaching and a reasonable degree of proficiency in it, realizing that teaching needs and styles differ in different schools but recognizing that they are present everywhere in the University.

   b. Formally affirm that during each academic year, except when on leave or primarily involved in administrative duties, every member of the faculty should be involved in some form of undergraduate and/or graduate teaching, by presenting courses, by involving students in their research, or by supervising independent work.

   c. Recognize that the faculties of schools offering both undergraduate and graduate degree programs are single entities, not separable into graduate and undergraduate faculties.

   d. Encourage the participation, wherever resources allow it, of the faculties of the graduate professional schools in undergraduate instruction.

2. Each entity responsible for recommending or reviewing academic promotion and appointments should recognize the teaching role of the University by giving significant weight to a candidate's commitment to teaching and his teaching skills and style. Candidates should be made well

aware that evaluations of their teaching will be taken into account by promotion committees.

3. The Dean of Undergraduate Studies should be a member of the committee charged with final deliberation on, and approval of appointment or promotion of faculty members who will teach undergraduates.

4. Whenever possible, departments should assign junior faculty members to teach courses in the area of their special interests and strive to have introductory general courses offered by senior faculty.

5. One of the prime purposes of the Innovation Fund* should be to provide funds for released time for faculty members of any rank who present meritorious proposals for new course structures, new academic programs, or other educational innovations. In addition, we recommend that the University seek a permanent endowment for the Innovation Fund so that it can continue to finance innovative educational excellence, especially in the area of teaching.

6. The University should establish a number of prize fellowships for distinguished teaching, which would be awarded, for limited periods, to faculty members selected by a student-faculty selection committee for their outstanding contributions as teachers. Fellows would receive the substantial salary provided by the endowment while departments would be free to spend the budgeted salary vacated by the recipient in whatever manner it chose during the term of the appointment. The securing of endowment for such fellowships should be a matter of high priority.

7. The University should establish the new faculty category of visiting University Professor to be occupied by men and women who have achieved distinction in some non-academic area, such as government or other public service, the professions, the arts, or industry. Appointments would be for fixed short terms, usually not renewable. Selection should be made by a special faculty-student committee of the Academic Senate.

8. An agency of the student body should devise, produce, and widely distribute a systematic evaluation of courses and instruction including valid empirical measures of student judgments.

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*See SES Report II, pp. 26–29.

9. The Academic Planning Office* should be responsible for developing, in consultation with faculty members, a diagnostic evaluation questionnaire and for conducting surveys of student opinion on specific courses, at the instructor's request. This service should be routinely available every quarter to all interested faculty members.

10. There should be established a teaching services center to assist interested faculty members and graduate students in the improvement of their teaching by:

a. Providing for videotape recording and analysis of lectures and discussions.

b. Offering seminars and lectures on teaching, testing, and instructional media.

c. Arranging for "clinical" services for individual faculty members.

11. Each department should study the cost-effectiveness of employing various types of faculty support personnel to achieve optimum use of faculty time. Student assistants should be employed wherever possible.

12. Attention should be given to the availability of suitably qualified persons in the University community who could teach in a range of undergraduate programs, such as remedial writing, recitation sections, freshman tutorials, and informal seminars. This should be done only at the instigation of the relevant department, school, or committee, and with appropriate budgetary arrangements and safeguards to prevent erosion of quality.

13. Members of the Stanford faculty should devote a substantial effort to making their scholarly research intelligible and interesting to non-specialists, in particular to their students. At the same time, the effort should be made to secure more widespread and active participation by undergraduate students in research activities.

14. Appropriate agencies of the Academic Senate should consider whether and how an Institute for Urban Studies and a Center for Environmental Studies should be established at Stanford.

15. Stanford should seek, alone and in concert with other universities,

a. To gain broad understanding in the government of the nature and needs of research as an integral activity of higher education.

b. To broaden the areas and reorder the priorities of federal research support.

*See SES Report I, Recommendation 1. Details Appendix 5, pp. 36–38.

c. To seek to develop among the government agencies policies compatible with University objectives in such matters as funding continuity, publication practices, cost recovery, and so forth.

16. The University should establish as a long-range and continuing goal the increase of endowment funds available for unrestricted support of faculty and student research.

17. Research policy should be established by the Academic Senate Committee on Research Policy. The Committee's concern with University research policy should include continuing informational, advisory, and initiatory functions.

a. Its informational functions would require such activities as a study of the ways in which research presently affects teaching, and the diffusion to all interested students and faculty of information about currently available research facilities and support.

b. Its advisory function would include recommending guidelines on such matters as a comprehensive University policy for present institutes or research bodies and the establishment of new ones; for classified research; and for the determination of the proper relation between contract research and the award of higher University degrees. It would not concern itself with such matters as the evaluation or approval of particular research projects or grants or degrees, or with the details of the procurement or allocation of research funds from outside sources.

c. Its initiatory functions would include assuring a high University priority for the provision of research funds and other resources for members of the University who at present lack them, especially graduate students and junior faculty.

To: Steering Committee, SES
From: Committee on Research Policy

Letter of Transmittal

At the outset, the Topic Committee on Research Policy chose to divide itself into three subcommittees–Government and Research, Goals and Decision-making Processes, Teaching and Research. Each subcommittee met periodically throughout the year and drafted a report which was presented to the full committee. Each of the reports of the subcommittees was discussed by the full committee and the following reports reflect the views of the entire parent committee.

Respectfully submitted,
Gerald A. Lieberman
Chairman

Government and University Research

Report of the subcommittee

Introduction

With respect to general problems of federal government involvement in university research and of the benefits and hazards arising therefrom, the subcommittee has augmented its own discussions with examinations of available literature, including the reports of studies by the National Academy of Sciences, National Science Foundation, and the American Council on Education. This report includes a summary of information we have been able to assemble, together with our evaluation of the trends represented. In examining particular problems arising at Stanford with regard to the effects of government support of research, we have had the benefit of excellent cooperation from members of the University administration and members of many departments that have major involvement in federally supported research. On the whole our conclusions are that the net effects of federal support of University research are favorable, with respect both to research activity and to the instructional functions of the University, and with respect to students as well as to faculty. At the same time we recognize certain hazards in overdependence of the University upon the government for research support and suggest some measures, which might be considered to mitigate this dependence and to further the positive benefits of research support for both graduate and undergraduate education.

Extent of Government Involvement in University Research.

The degree of dependence of research in American universities upon government financial support at present is hard to overestimate. Recent quantitative data are not readily available, but several studies conducted in the period 1950 to 1960 have been reported, and one can safely assume that the trend up to the last year or two has been a steady increase in the extent of federal support and federal involvement in university research.

Summarizing the results of a study reported by the National Science Foundation for 1959, C. V. Kidd, *American Universities and Federal Research* (1963) states that the extent of government involvement is so great that the universities themselves finance less than 10 percent of the research their faculties conduct. Of course summary figures of this sort cannot be taken at face value since they represent averages across many different kinds of institutions and do not necessarily take into account some of the universities' contributions to the research effort. A breakdown of sources of support for university research in the sciences and social sciences (from D. M. Keezer, *Financing Higher Education*, 1959) is given in Table 1. It is to be noted that the direct support of unsponsored research by university funds was approximately constant in dollars from 1954 to 1959 (therefore actually decreasing) whereas government support nearly doubled, and it seems likely that the same trends must have continued at least through 1965 to 1966. A study of thirty institutions by the American Council on Education in 1954 reported that the average percentage of the annual budget of these institutions represented by government sponsored research was 16 percent. You will notice, however, that there were major differences between private and state supported institutions. For the state universities reported in the study, only 8 percent of the total annual budget represented federal government sponsored research whereas for the private institutions the figure was 25 percent. It is not clear how much "university-funded" research in state universities is really government supported out of state, rather than federal, tax revenues. It is known to be substantial in a number of schools, sometimes provided in the form of research grants, sometimes through the general budget (to cover faculty research time). Recent events in California suggest this support not to be invulnerable.

Actually the degree of support of research from federal sources varies quite widely among fields within institutions. A picture of this distribution revealed

Table 1

Sources of Funds for Research in American Universities*
(from Keezer, *Financing Higher Education*)

Sources	*1953–1954 Amount***	*%*	*Estimate 1958–1959 Amount***	*%*
Universities' own funds				
Unsponsored research	35		35	
University contributions to cost of government sponsored reaearch	35		95	
University contributions to other sponsored research	20		30	
	90	32	160	32
Federal Government	142	50	266	53
Foundations and health agencies	23		45	
Industry	19		25	
Other gifts and grants	5		5	
	47	18	75	15
TOTAL	279		501	

***Including all natural sciences and social sciences, but excluding humanities. Not including Federal Research Centers or Agricultural Experiment Stations.**
****Amounts in millions of dollars.**

Table 2

Percentage Distribution of Support between Federal Government
University Funds, & other Sources

Source	*Federal*	*University*	*Other**
Life sciences	50	12	38
Physical sciences	86	4	10
Engineering	82	6	12
Psychology	76	9	15
Social sciences	25	23	52
All other	50	20	30

***Foundations, industry, special grants and gifts from private sources. From: National Science Foundation, *Scientific Activities for Research and Development in Colleges and Universities–Expenditures and Manpower*, 1953–1954.**

by a National Science Foundation Study in 1954 is given in Table 2. The differential extent of federal involvement in different fields shown in this table will be of some import in a later section of this report, since it provides one of the few bases available for evaluating the effects of massive federal research support upon university programs.

Turning to our own institution in particular, it is well known that Stanford is one of the small number of universities for which major growth and expansion during the post-World War II period has been associated with very great contributions from federal research funds. In a study reported by The Carnegie Foundation for the Advancement of Teaching in the *Educational Record* for April 1963, based on data submitted by the institutions during the year 1959–1960, 40 percent of the total operating expenditures at Stanford represented federal funds expended for departmental and extra-departmental research. At that time Stanford was the third ranking institution in the United States with respect to total federal project research support, second with respect to federal funds for construction and equipment, and third with respect to total federal funds for departmental research. The distribution of sources of research support at Stanford in 1966–1967 is given in Table 3.

Table 3

Support of Research at Stanford (excluding SLAC)
by Grants & Contracts 1966–1967

Source	*Government**	*Other**
Grants	21,170	1,823
Contracts	22,308	125
TOTAL	43,478	1,948
PERCENTAGE	96	4

***Amounts in thousands of dollars.**

Benefits from Federal Support of Research.

In view of the almost overwhelming extent of federal involvement in research at Stanford, we should expect the benefits of federal support to be especially conspicuous. Indeed some of the beneficial results are too obvious to need much documentation from formal studies. Along with a small number of other major institutions, Stanford has been almost literally boosted into the position of a center of excellence in the sciences and engineering, with enormous growth in science faculty, graduate student population, and physical facilities and resources. Graduate education in this and similar institutions has been all but revolutionized during the postwar period, with a very large increase in the number of graduate students, similar increase in the adequacy of financial support, the bulk of which comes from federal sources, and commensurate increases in financial support of research on the part of students and facilities available to them.

In all scientific fields at Stanford graduate students are able to gain firsthand experience with advanced types of scientific instrumentation including computers and computer-controlled apparatus. The lot of the faculty member, in science and engineering fields at least, is in general much improved as a direct result of federal research support, with such tangible advantages as summer salaries, reduced teaching loads, and research facilities, which would be far beyond the institution's financial resources to support. While the direct benefit is to those departments and schools in a position to seek out and acquire federal support, there is a wider indirect benefit. The programs gaining outside support can help to reduce the pressure on the limited University funds (and unrestricted fellowships), which then can favor research in areas less attractive to federal support. Further study is needed to determine whether this indirect effect is large enough to prevent the disproportionate growth of departments that have substantial federal research support.

Corresponding benefits to undergraduate students are hard to document by statistical studies, but many members of the committee can cite examples from firsthand experience in their own departments. One of the most important and most readily documented, perhaps, is the great increase in opportunities for undergraduates to gain research experience as undergraduate assistants in laboratories and in summer programs supported by the National Science Foundation. A considerable number of undergraduates in scientific fields have published articles in scientific journals and can be found attending scientific meetings and, in some instances, even giving papers. Further, there is little doubt that an indirect result of extensive federal support of research at Stanford is a wider range of specialized courses available to undergraduates and increased opportunities for them to associate with individuals who are active in research and governmental affairs. A particularly conspicuous example of a direct and tangible benefit to a large number of undergraduates is the availability of the Computation Center, which, of course, has been developed primarily through cooperation between the University and governmental agencies and with major support from federal funds. A large number of Stanford undergraduates every year gain sufficient firsthand familiarity with computer techniques to be able to make use of computers in research, engineering, or business applications.

Our impressions in these respects seem to fit well with the conclusions reached by Kidd[7] as a result of his extensive analyses of the national situation regarding federally supported research in the universities.

> University research in virtually all fields is more extensive, and in most fields of higher average quality, as a result of federal funds. The size and complexity of the total research effort have not stifled the individual. . .
>
> The federal funds have improved the quality of graduate training in the physical and biological sciences. They have also tended to increase the number of graduate students, but other forces have been much more important. Graduate students of exceptional intellectual attainments are probably better trained than ever before, in part because of the existence of federal funds. . .
>
> Federal research funds have, beyond any doubt, been the most important influence in making the university laboratories of the United States very well equipped, with markedly favorable effects on both the quantity and quality of research. . .
>
> While these views on the effects of federal funds are subjective, there is wide agreement that research, and universities, are substantially better off with the money than they would have been without it. The dangers of federal domination of science and of pressures towards mediocrity, predicted when federal funds were first made available on a large scale, have for the most part remained potential. When one considers the dangers which have been averted, the financing of university research by the Federal Government must be judged a success from the viewpoint of both parties.

Much the same points were made in the reports of Institutional Self Studies conducted under the auspices of The Carnegie Foundation[8] with as much emphasis on improved quality of programs made possible by project research support as on quantitative expansion. For example one institution concluded, "Any university that declined to participate in the growth of sponsored research would have had to pay a high price in terms of the quality of its faculty in the science and engineering areas." (p. 106) A questionnaire study of deans of graduate schools and heads of scientific departments conducted by C. V. Kidd in 1957 yielded a somewhat broader sampling of the opinions on these issues. Some principal findings were that 70 percent of the individuals replying said that federal funds had increased the quality of work in their fields either moderately or markedly, and only 10 percent believed that the result had been a moderate decrease in calibre of research. Some of the factors widely reported by this group to have been favorably affected by the increase in federally supported research were availability of instruments (not surprising), availability of faculty for teaching, absorption of students in training, and the total supply of teachers.

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[7] op cit, pp. 210–12.

[8] Educational Record, 1963 op cit.

Disadvantages & Dangers in Federal Involvement in University Research.

We are well aware that the various sources of testimony concerning the value of the partnership between universities and government are but one side of the coin and perhaps not the most conspicuous one in the public eye. More negative opinions, ranging from mild reservations to cries of alarm are to be found readily. For the most part members of academic institutions who have studied this problem find little basis for serious criticism. For example in Keezer (op cit) it is conceded that:

> There is often the criticism that faculty members become so involved in and imbued with research that they neglect their teaching duties. In individual cases that may be true, but the impact is serious only in a few instances in which conventional undergraduate instruction is involved. . . By and large, the research versus instruction pattern is not unbalanced and there is not much danger that it will become so–(p. 100).

The Committee on Science and Public Policy of the National Academy of Sciences takes a somewhat more sober view.

> Two trends are discernible which, if extended far enough, would lead to the impairment of the fruitful combination of research with graduate education. In some fields, basic research has moved into laboratories

> that have lost close touch with the university teaching departments. The other trend that may impair the fruitful combination of research and graduate education stems from a lack of strong policy within the universities themselves. Administrations, under pressure to retain distinguished scientists who are tempted by the simplicities of life in non-teaching laboratories in government, research institute, or industry, find that the easiest counteroffer is a promise of reduction in teaching. Some scientists retire from virtually all contact with students, while others only a little less distinguished are so overloaded with teaching that they are forced out of research. Administrations, hoping to add to the prestige of their universities by encouraging large-scale research projects of high visibility, may expect faculty members to buy large amounts of released time from the university.[9]

Some of these "potential dangers" and "exceptional instances" are fodder for sweeping criticisms of the universities by public figures, as, for example, in a senate speech by Senator Fulbright, December 13, 1967, which runs in part:

> The universities might have formed an effective counterweight to the military-industrial complex of strengthening their emphasis on the traditional values of our democracy, but many of our leading universities have instead joined the monolith, adding greatly to its power and influence. . .
>
> The bonds between the government and the universities are no more the result of a conspiracy than those between government and business. They are an arrangement of convenience, providing the government with politically usable knowledge and the universities with badly needed funds. Most of these funds go to large institutions which need them less than some smaller and less well known ones, but they do on the whole make a contribution to higher learning, a contribution, however, which is purchased at a high price. . .
>
> That price is the surrender of independence, the neglect of teaching, and the distortion of scholarship. A university which has become accustomed to the inflow of government contract funds is likely to emphasize activities which will attract those funds. These, unfortunately, do not include teaching undergraduates and the kind of scholarship which, though it may contribute to the sum of human knowledge and to man's understanding of himself, is not saleable to the Defense Department or the CIA. . .

[9] *Federal Support of Basic Research in Institutions of Higher Learning*, 1964, pp 92–93.

> Among the baneful effects of the government-university contract system the most damaging and corrupting are the neglect of the university's most important purpose, which is the education of its students, and the taking into the government camp of scholars, especially those in the social sciences, who ought to be acting as responsible and independent critics of their government's policies.

Some of the same points were made somewhat more judiciously in a speech by Representative John Brademas, November 30, 1967, which includes the following passages:

> I pass now to a second issue, one with two dimensions. Its first aspect is the argument that research support is necessary in all fields in order to improve the quality of instruction; its second is the counter argument, voiced in recent years by an increasingly articulate and aroused student body and ably supported by other standard bearers as well, that the presence of large scale research on college and university campuses across the country actually creates a severe drain on teaching. . .
>
> Both of these questions have been a subject of considerable debate, and the testimony available on all sides of the issues is voluminous. . .
>
> Intuitively it is easy to see how the presence of research in the university environment contributes to the timeliness, the relevance and the currency of instruction in higher education. I am also aware of the sense of rigor which teaching can impart to research. . .
>
> In short, there are strong logical arguments for supporting full-fledged research and teaching programs in colleges and universities. . .
>
> On the other hand, logic and intuition must themselves be subject to the test of reality, and one of these realities is the persistent complaint from various quarters that the rhetoric does not jibe with the facts. Increasingly researchers simply are not teachers, and teachers are not researchers. The functions become separated in the university. The students bewail their lack of access to their professors and complain of the degree to which they are made to feel that they are a relatively minor and annoying impediment to the real business of university—which is servicing the research needs of federal agencies and foundations. . .
>
> The need for hard data here, for relevant evidence, is clear. While logic is neat and intuition compelling, they cannot continue to be the sole basis of national research policy.

The last paragraph above is a somewhat refreshing change from the voluminous expressions of opinion and counteropinion by individuals concerned with these issues at all levels, rarely leavened by any demand or offer of documentation. Of course one of the reasons for the paucity of relevant factual data is that few sources are readily available, and few individuals are in a position to devote major time and effort to this type of research. A few relevant items of information that we have been able to assemble are the following.

Firstly, in order to gain some information bearing on the possibility that availability of undergraduate courses or the participation of senior faculty in these courses are affected to an important extent by different degrees of federal support available in different areas, we have examined the course offerings at Stanford during 1966–1967. For each of the areas listed in Table 4 we determined the number of senior faculty, that is, the professors and associate professors, in the constituent departments and then computed the mean number of listings of each senior faculty member in courses at the low undergraduate, advanced undergraduate, and graduate levels. Thus, for example, under Engineering we note that on the average each senior faculty member appeared slightly more than once in the listings of advanced undergraduate courses, slightly over three times in the listings of graduate courses,

Table 4

Listings of Stanford Senior Faculty by Course Levels and Areas During 1966–1967

	Mathematics, Statistics, Computer Science (N=47)			*Physical Sciences (N=51)*			*Engineering (N=108)*		
	1–99	*100–199*	*200+*	*1–99*	*100–199*	*200+*	*1–99*	*100–199*	*200+*
Mean*	.52	.64	1.38	.53	.55	1.18	.30	1.11	3.36
%	.14	.27	.59	.23	.25	.52	.07	.23	.70
	Biological Sciences (N=22)			*Social Sciences (N=108)*			*Humanities (N=112)*		
	1–99	*100–199*	*200+*	*1–99*	*100–199*	*200+*	*1–99*	*100–199*	*200+*
Mean*	.14	1.36	1.65	.30	1.41	1.67	.48	1.58	2.41
%	.06	.53	.41	.10	.41	.49	.11	.35	.54

***Mean number of listings per faculty member at each level.**

and that about one senior faculty member in three in these departments was listed for a junior division course. Or, in percentage terms, slightly under 10 percent of the senior faculty time, as reflected in these listings, was devoted to junior division teaching, 23 percent to advanced undergraduate teaching, and about 70 percent to graduate teaching. We hasten to agree with readers who wish to point out various reasons for being cautious about concluding much from statistics of this kind. For example, the 70 percent focus on graduate teaching in Engineering (Table 4) is not surprising when it is recalled that currently 73 percent of the engineering students at Stanford are graduates. Indeed, the 7 percent, 23 percent, 70 percent senior faculty involvements in junior division, advanced undergraduate, and graduate teaching closely parallel the relative numbers of courses offered at these levels, 6 percent, 23 percent, and 71 percent of the total in the 1966–1967 period. Further, these statistics should not be taken as absolute indices of teaching load, or of anything else; they can validly be taken only to reflect relative distributions of teaching effort over levels in different areas.

The main point of interest from the standpoint of the problem at hand is the fact that the distributions vary somewhat from field-to-field but not in any obvious relation to different degrees of federal support of research. Thus, for example, the highest average frequencies of appearance in junior division courses appear in physical science and the humanities, the highest frequencies in advanced undergraduate courses in the biological sciences, social sciences, and humanities; in each case we observe a mixture of fields having high and low relative degrees of federal research support. A suggestion that might be made on the basis of these data is that the criticism that increased support of research takes the faculty member away from teaching does not necessarily imply a reduction in the amount of teaching being done at any given level or of the availability of faculty to students. The departments which have greatly increased their research commitments and level of research support during the postwar period are at the same time those which have commensurately increased the sizes of their faculties. Consequently within a given institution, such as Stanford, it is not *necessarily* the case that anything has suffered as the result of increased support of research scholarly activities and various forms of public service on the part of the faculty.

In short, we find justification for the concerns regarding potential disadvantages of great moment developing from federal sponsorship of research. For example, we are aware of situations at other universities, which might support the contentions of Senator Fulbright. But we do not find justification for his general conclusions so universally applied; they would bespeak a total lack of administrative alertness within all institutions. There remain as problems in any event, a major dependence on the broad continuation of federal support, plus the inevitable instances of individual hardship. We comment later on these matters in the local scene.

Although critics who claim overemphasis upon research in universities frequently cite student complaints that research-oriented faculty have little interest in teaching, almost no systematic data on student opinion seem to be available and what there are do not strikingly support these allegations. For example, ratings of the Stanford engineering faculty by students (reported by Professor Rambo) yielded little difference in average ratings of faculty heavily engaged in research and faculty not so engaged. Similarly a study of student evaluations of faculty effectiveness[10] showed a distinct positive correlation between student ratings and receipt of government research support by faculty.

Another possible danger in heavy research support, which is often heard, is that students will tend to go into the areas with such support to the detriment of others. Again systematic data revealed trends quite different from those that might be expected on superficial grounds. For example a very extensive survey of career choices by undergraduate students reported in a forthcoming volume by Alexander Astin (our information coming from Professor Brody) reveals that between 1961 and 1965 the largest percentage increases of career choices by a sample of more than 36,000 college students were housewife, college professor, and business executive–all the sciences except psychology showing decreases and the largest decreases in physics, chemistry, and mathematics. Over the same period the choices of major fields increased greatly in economics, philosophy, zoology, and, to a lesser extent, social sciences and psychology, while choices of mathematics, the physical sciences, and engineering all decreased. There certainly is no basis in these statistics for the idea that fields favored by heavy research support are at an unfair advantage in competing for students.

The possibility that excessive dependence upon federal research support may undermine the faculty member's freedom to follow his own best intellectual interests with regard to lines of research is impossible to evaluate by statistical studies. There can be no doubt but that the danger exists, and instances with which members of the committee have firsthand acquaintance at Stanford show that the dangers are not entirely potential ones. Some faculty members have been recruited on the basis of offers involving very attractive teaching loads, with salaries split between University funds and research contracts. Upon expiration of the contracts, these faculty members have in some cases sought continuing grant or contract support with one primary purpose being to continue obtaining a portion of their salaries from outside sources and thus to maintain their desired teaching arrangements.

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[10] J. B. Bresler, "Teaching Effectiveness and Government Awards." *Science*, April 12, 1968. Vol. 60, pp. 164

Another type of stress, which sometimes develops, is illustrated by a faculty member who had a research contract for a number of years from a federal agency, which allowed considerable freedom in following his own research interests. Upon renewal of the contract, however, the faculty member found himself in the position of being asked to take on a developmental project of interest to the agency in order to continue receiving support, the alternative being the termination of the contract and the loss of support for his graduate students and laboratory.

The third problem is illustrated by a senior faculty member who developed an interest in a new research area and applied for a research grant to permit him to follow this interest simultaneously with a renewal application for support of his customary line of research. The latter application was approved, but the former refused on the ground that the investigator did not have an adequate publication record in the area in which he was developing a new interest. In both of these last two types of cases, the investigator's freedom of action could have been preserved if the University had some funds available for research support, which, in the former case, could have supported the man's laboratory while he investigated other sources of outside grants, and, in the latter case, financed preliminary studies that might have developed the basis for an adequate grant application.

Administrative Practices at Stanford with Regard to Government Support of Research.

With regard to salary splitting between the University and outside sources of research funds to build faculty, Stanford has perhaps gotten further out on a limb than many other major universities. One well-known consequence is the eminence of the University in a number of scientific fields. There have undoubtedly been inequities among departments in the availability of federal funds for this purpose, but the bases for these are largely beyond the University's control. The vulnerability of University programs to any sudden shrinkage in the extent of federal research support is a cause of concern to members of the administration and faculty alike. While plans should be, and are, being made to cushion the affects of such a contingency, undoubtedly the only long term answer is an adequate increase in other sources of funds for University programs. Faculty members could aid in this effort to some extent by exploring more vigorously alternatives to the federal government as sources of research support.

There are two facets to the Stanford research policy not always duplicated elsewhere that are of great value. One requires that all arrangements for sponsored research be completed, and broadly administered, through the University (rather than as private arrangements between the principal investigator and sponsor). This guarantees a compatibility with the broad research objectives and practices of the University. The second principle relates to the Stanford goal of full cost recovery on grant and contract research. Were this not generally gained, the presence of large-volume, sponsored research would represent an inequitable drain on University resources. In short, the ten-fold gain in sponsored research in the past 12 years (exclusive of SLAC) would not have been reasonable (nor possible) except on a largely self-supporting basis. While the bulk of the better than $43 million grant and contract volume reported for 1966-1967 in Table 3 covered direct research costs, approximately $8.5 million of overhead recovery was added to and deployed beneficially through the general operating budget.

Research programs at Stanford are initiated by individual investigators, or in some instances groups of investigators, and not by members of the administration at any level. Research proposals are of course reviewed by the appropriate deans and by the Associate Provost for Research, the review including such obviously important points as the academic propriety of the proposed work, the commitments involved for new staff and for space, cost sharing between the University and outside agencies, and the relevance of the work to the University's primary mission of education.

We consider this largely decentralized review process appropriate (and adequate). Because it can be flexible, timely, and informed, it is preferable to a review for content of all proposals by a University-wide standing committee (as is done at a few universities). The Committee on Research Policy of the Academic Council deals with a number of important policy and operational matters, including the sensitive area of classified research. A subcommittee specifically on classified research reviews (properly) all proposals that involve a security classification. The procedures by means of which the committee has so far succeeded in balancing the objectives of the University and the freedom of individual investigators are described in the committee's annual report to the Academic Council, September 1, 1967.

This committee is cognizant of the fact that not all intellectually interesting and important problems fall within the purview of one academic department; we recognize further that special grouping, institutes, and interdepartmental programs can facilitate interchange directed to these problems. However some faculty members have expressed concern over procedures and standards involved in recruiting faculty whose primary responsibility is to research institutes or programs that fall outside of academic departments. The qualifications of such faculty are reviewed on the same basis as faculty recruited for academic departments and presumably must come up to the same standards. However, some individuals feel that on occasion members of related departments have not had an adequate voice in the selection of faculty for research institutes or regarding the manner in which their contributions to teaching and graduate training are fit in with those of the academic departments. One concrete suggestion arising from our discussion, which might help avoid difficulties or even the appearance of difficulties in these regards, might be to establish the custom that the Academic Senate be consulted at an early stage in the consideration of planning new research institutes, which are to be formed outside of the academic department and school structure.

Recommendations.

In view of Stanford's enviable reputation as a center for research and scholarly activity and of the important role of federal support in bringing the University to this position of eminence, we believe it would be most unwise to consider any action that might impair or disrupt the fruitful partnership between the University and federal government in response to vague apprehensions or undocumented criticisms. Criticism is inevitable when any activity has high visibility. During the 1930s and '40s university faculties were criticized for the ivory tower syndrome; now they are criticized by much the same sources—political figures, free-lance writers, student activists—for their involvement in federal research programs, public affairs, and a broad spectrum of other off-campus activities. Nonetheless, some of the criticisms are well taken, and some of the fears are not without foundation. We propose for consideration the following measures, which might serve to mitigate these.

1. Attempts should be made to secure more widespread and active participation by undergraduate students in research activities. Several ends could be served simultaneously if outside support from private sources could be obtained to finance work by students as undergraduate assistants in research laboratories.

2. We suggest that any proposed formation of major research programs or institutes outside of the normal academic structure be called to the attention of the Academic Senate at an early stage in planning. Further, when new or existing institutes propose offering courses not under departmental sponsorship, the plans, including qualifications of personnel, should be reviewed by the Senate.

3. In spite of the difficulties, efforts need be made to mitigate some of the extreme dependence of University research upon federal support. Persisting efforts need to be made to increase, at least to a modest extent, the University funds available for research support. These could help the faculty to resist outside pressures, help new faculty to be more independent in following their own interests, and help insure the free choice of faculty advisers by graduate students. We are not optimistic regarding any substantial success in immediately accelerating the build-up of the non-federal research support base (gifts, foundation programs, industrial programs, etc.) for either present or new research areas. But the developing national climate argues eventual possibilities; in particular, the chances for new interdisciplinary and multi-discipline programs must be closely watched.

4. Much of the success of the university-government relationship in research depends on the attitudes and practices of the federal government. We recommend full support for, and further development of, the efforts of Stanford alone and in concert with other universities: a) to gain broad understanding in the government of its essential role in this (research) phase of higher education, b) to broaden the areas of federal support of research, and c) to work to develop, with the various agencies of the federal government, policies in support of research more compatible with the university environment, e.g.,– funding continuity, publication practices, cost recovery.

5. An attentive and alert administration of research policy is an essential element in the local scene. We suggest that if the now vacant post of Associate Provost for Research were reactivated, perhaps with some reassignment of responsibilities, there could be major benefits externally, for example in connection with Recommendation 4 above, and internally in the development of sound interdisciplinary programs in various forms (Recommendations 2 and 3).

Goals and Decision-making Processes of the Committee on Research

Report
of the
subcommittee

Preliminary Considerations

The problems with which the subcommittee is concerned arise out of two main formulations of the general issues.

The first is the general instruction to the main committee attached to the letter of Professor Herbert L. Packer, chairman of the Steering Committee of the SES to Professor Gerald J. Lieberman, chairman of the Topic Committee on Research Policy of October 16, 1967:

XIV. RESEARCH
- A. Are we keeping research in proper balance with our teaching function?
- B. Should we seek to encourage new kinds of research?
    1. Problem centered, interdisciplinary study?
    2. Research on university education and operation?
    3. Other new research activities?
- C. Should we seek to enlarge university-sponsored research, perhaps through institutional grants?
    1. For departmental and inter-departmental work?
    2. To support student research projects? Undergraduate as well as graduate?

The second is the particular recommendation to the subcommittee, which was contained in the minutes of the Committee on Research's meeting of November 20, 1967:

> III. *Goals and Decision-making processes*
> A. Does the research we do have an impact on society?
> B. What are the fashions in research? Does society know? Does it want to?
> C. Should the faculty participate in making decisions about research?
> D. What are the relationships between institutes and departments? e.g., faculty of the institute might not be members of the associated department. There might be interdepartmental or interdisciplinary problems? the institute and the department may differ on the general question of standards of performance for degree qualifications–the institute may be satisfied with a student's performance but the degree granting department may not be.
> E. What are the issues involved in individual versus department control of research funds? e.g., do we want the University to have overall control? Should anyone tell any researcher what he can do? What are the special problems of outside control when the institute (e.g., SLAC) belongs to a national agency?
> F. What are the conflicts between basic and applied research?
> G. What is the present research policy of the University?
> H. What are the advantages of University-wide information about research?

The committee's discussions have largely centered in B(1) and (3) of the General Instructions, and on (F) of the recommendations to the subcommittee. However, many of the other issues have been touched on, directly or indirectly, and the following represents an attempt to incorporate a consensus of views about most of these issues into a single recommendation, which may serve as the basis of discussion for a final report to the main committee.

Report

The subcommittee finds it difficult to give any complete answers to such questions as "Are we keeping research in proper balance with our teaching function?" or "What impact does the research we do have on society?" Such large issues require a great degree of both information about the vast body of relevant facts and consensus as to precise relationships between teaching and research, which should determine the future policy of the University. It believes that at present the University cannot be said to have a research policy, but rather that the research now being done (together with its multiple and problematic implications, both for the present composition of the faculty and for the educational and physical development of the University as a whole), appears to be largely the result of a sequence of historical accidents. The main determinants have been, on the one hand, particular requirements and budgets of the various public and private institutions that subsidize research, and, on the other hand, the research predilections and fund-raising capabilities of individual members of the faculty.

The committee recognizes that the prevalence of this laissez-faire has the support of many, possibly most, of those faculty members who are directly involved in subsidized research. Their position can find some justification both in the material and educational benefits that accrue from such research, and in the traditional academic principle of *Lehrfreiheit und Lernfreiheit*.

However, the committee also notes recent, widespread criticism of the results of this laissez-faire. On the negative side: many persons believe that much is done in the name of the University that would not be done if the faculty had been consulted before institutes and projects were begun; they further feel that some of these projects may or could derogate from the good name of the University by associating it with forms of applied research that are either irrelevant to the traditional primary concern of academic institutions or concern activities of a primarily military, intelligence, or propagandist nature. On the positive side: the committee believes that there are many areas of social relevance in which the University could make a valuable contribution if an effective instrumentality for initiating such work were set up.

It seems self-evident that it is a major function of universities to apply their intellectual resources to important social problems, and the committee believes that the possible dangers of over-involvement in society are minor in comparison with those of irrelevance. The committee is also convinced that the programs outlined in Appendices 4 and 5 would be of great interest to undergraduate and graduate students. They would make available course and research opportunities that would be especially valuable for those members of the student body who object—with some justice—to the social irrelevance of much of the University's teaching and research.

Recommendations

1. The subcommittee therefore recommends that an appropriate committee on university research policy be set up to formulate a general University policy on all aspects of research in the University.

The subcommittee believes that it would be premature to lay down either the precise composition, the exact functions, or the institutional relations with already existing committees on research, of this University committee on research policy. However, it offers as the basis for discussion, the following general description:

Composition. The committee should be a permanent standing committee of the Academic Senate, in which the faculty, the student body, and the administration would be represented.

Functions. The committee's concern with University research policy would involve continuing informational, advisory, and initiatory functions.

a. Its informational roles would require such activities as a study of how research at present affects the teaching functions of the University, and the diffusion to all interested students and faculty of information about what research facilities are currently available.

b. Its advisory function would include recommending guidelines on such matters as a comprehensive University policy for present institutes or research bodies and the setting up of new ones, contract and classified research, the determination of the proper relation between contract research and the award of higher University degrees. It would not concern itself with such matters as the evaluation or approval of particular research projects or grants or degrees, or with the details of the procurement or allocation of research funds from outside sources.

c. Its initiatory functions would include assuring a high University priority for the provision of research funds and other resources for members of the University who at present lack them (especially graduate students and junior faculty) and proposing the establishment of new interdepartmental and interdisciplinary programs.

It is recognized that the foregoing functions can be served by broadening the scope and composition of the existing Committee on Research Policy or by establishing a new committee of the Academic Senate.

2. The subcommittee further recommends that the committee on University research policy should, as a matter of priority, concern itself with the following particular issue: whether and how comprehensive programs should be set up along the lines suggested in Appendices 4 and 5. The proposals were drafted by two members of the committee, Marvin Chodorow and Sidney Liebes, Jr., respectively.

Teaching and Research

Report of the subcommittee

Introduction

This subcommittee considered the question stated in the original preliminary agenda of SES: "Are we keeping research in proper balance with our teaching function?" Underlying this question are alternative views as to possible relationships between research and teaching: 1) research interferes with good teaching, i.e., detracts from the quality of the faculty's teaching effort; 2) research enhances teaching, i.e., makes the faculty better informed and more insightful in the discipline being taught; or 3) teaching and research are unrelated activities, for the most part, i.e., have little effect upon one another despite the fact that they are often performed by the same persons. (In the latter view, even if some correlation between effectiveness in teaching and effectiveness in research were found, it would be due to the causal influence of a third kind of variable, such as the faculty member's general level of ability, motivation, and energy, which determine the quality of both his teaching and his research.)

In any case, it must be assumed in posing the foregoing question that both teaching effectiveness and research effectiveness can be measured. This assumption seems at present to be warranted in the case of research; faculty members and academic administrators do appraise the research of their colleagues on the basis of publications, research grants and contracts, and the like. The same cannot be said of teaching.

The Subcommittee's Discussions

In its effort to contribute to the understanding of the relationship between research and teaching, the subcommittee engaged in several discussions. Some of the subsidiary questions that emerged were the following:

1. Is more stress laid on teaching or research as criteria for appointment and promotion?

2. What are the effects of the absence of the faculty from campus and from the classroom?

3. Is there a neglect of teaching because of research?

4. What are the effects of research on actual classroom performance?

5. Does the prevalence of research cause students to specialize before they are prepared to?

Early in the subcommittee's discussions, the point was made that the relationship of research to teaching should be considered in the light of the various purposes of teaching in a university. Among the purposes identified were 1) the introduction of the general student body to the significant ideas and basic facts of a discipline, 2) the training of students in a discipline in the methods and techniques of the field, and 3) the preparation of the most interested students for deeper graduate study and a career in the discipline. On teaching for some of these purposes, research may have a desirable effect, while on teaching for other purposes, research may have a deleterious effect. His research might enhance the freshness and authority of the advanced-course teacher, while, on the other hand, the research of the introductory-course teacher might make his course overspecialized and unbalanced. Similarly, it could be argued that contact with teachers engaged in research stimulates scientific interest earlier among students or, on the other hand, that research makes the teacher lack time for adequate contact with his students and even makes the specialist shun teaching as a distraction from his research.

It soon became apparent that mere exchange of opinion among members of the subcommittee would not advance its work sufficiently. So the committee considered the possibility of conducting questionnaire studies of the faculty and the student body. Some of the kinds of questions considered for inclusion in these questionnaires are shown in Appendix 6.

The subcommittee discussed these questions and others that might be incorporated into a questionnaire to be administered to a sample of the Stanford faculty and student body. But it appeared subsequently that such an effort on the part of this subcommittee might be unnecessary because other surveys of faculty and students were already underway or planned. Preliminary results of these surveys were made available to the subcommittee by the SES staff and are presented below.

Faculty Opinion on Research and Teaching

It is almost universally charged that faculty members at universities like Stanford quickly learn, or at least gain the impression, that they must "publish or perish," i.e., their rewards depend on their research publications, grants, and contracts. This condition alone is sufficient to cause research to have a debilitating effect upon teaching, it is argued. Evidence on this belief was available from surveys of Stanford faculty opinion.

The School of Humanities and Sciences faculty. In a recent interview study (conducted by Robert Hind) of 100 representative members of the faculty of Stanford's School of Humanities and Sciences, the faculty members were asked to estimate the importance of evaluations of various activities in the determination of promotions and salaries. The questions and the distributions of responses are shown below.

First, I would like to ask you some questions about the evaluation of your classroom teaching. How much influence does the evaluation of your teaching have in determining your University rewards? Would you say it is

1. Extremely influential	5%
2. Very influential	14%
3. Moderately influential	24%
4. Slightly influential	39%
5. Not at all influential	14%
No response	4%

Now I would like to ask you a few questions about evaluation of your work in research and scholarship, and how these affect your University rewards.

How much influence does the evaluation of your research and scholarship have in determining your University rewards? Would you say it is

1. Extremely influential	58%
2. Very influential	18%
3. Moderately influential	13%
4. Slightly influential	3%
5. Not at all influential	6%
No response	2%

It is clear that, in the eyes of the Humanities and Sciences faculty, research and scholarship are seen as much more influential than teaching in determining University rewards.

When respondents were asked how much influence evaluations of each of these kinds of activity *should* have in the determination of rewards, the results for teaching and for research and scholarship were as follows:

How much influence do you think the evaluation of your classroom teaching should have on your University rewards?

1. Extremely influential	14%
2. Very influential	37%
3. Moderately influential	30%
4. Slightly influential	14%
5. Not at all influential	4%
No response	1%

How much influence do you think the evaluation of your research and scholarship should have on your University rewards?

1. Extremely influential	34%
2. Very influential	35%
3. Moderately influential	24%
4. Slightly influential	4%
5. Not at all influential	2%
No response	1%

These results show that, although the majority of this sample saw research as having at present much higher pay-off than teaching, these members of the faculty would like to see the two kinds of work given more nearly the same degree of importance.

Do estimates of the importance assigned to teaching, on the one hand, and to research and scholarship, on the other, have any relationship to the way in which faculty members distribute their time? Members of the faculty were asked to estimate the percentage of time they spent in various activities—undergraduate classroom teaching, graduate classroom teaching, and research and scholarship. The 100 members of the sample were put into two groups according to their estimates of the present importance of evaluations of teaching in determining University rewards. Results of these cross-tabulations were as follows:

		Estimate of Influence of Evaluation of Teaching	
Estimate of Time Spent in Undergraduate Classroom Teaching		*Extremely, Very, or Moderately Influential*	*Slightly or Not At All Influential*
		(N = 43)	(N = 53)
High	(20% or more)	65%	43%
Low	(0–19%)	35%	57%
		100%	100%

		Estimate of Influence of Evaluation of Teaching	
Estimate of Time Spent in Graduate Classroom Teaching		*Extremely, Very, or Moderately Influential*	*Slightly or Not At All Influential*
		(N =43)	(N = 53)
High	(15% or more)	77%	47%
Low	(0–14%)	23%	53%
		100%	100%

		Estimate of Influence of Evaluation of Research	
Estimate of Time Spent in Research and Scholarship		*Extremely, Very, or Moderately Influential*	*Slightly or Not At All Influential*
		(N = 43)	(N = 53)
High	(30% or more)	63%	40%
Low	(0–29%)	37%	60%
		100%	100%

These results indicate clearly that faculty members who regard teaching as highly important in the determination of their University rewards tend to devote more time to teaching. Those who regard research as highly important in the reward system tend to devote more time to research.

The University faculty. During the winter and spring quarters of 1968, interviews were conducted by emeritus members of the faculty with a representative sample of the entire faculty of the University, excluding the Medical School. One of the questions asked is shown below with the percentages of "Yes" responses.

What particular pressures contribute to the feeling that you can never get quite caught up? Do they include. . .

	Yes
Obligations or commitments to do too much writing?	43%
Too heavy a teaching load?	20%
Heavy obligations within your profession?	35%
Too heavy a research load?	35%
Heavy student demand on your time?	26%
University service?	30%
Insufficient clerical help?	34%

Cross-tabulations showing the relationship between these various responses are yet to be made. These cross-tabulations will show how feelings of having too heavy a teaching load are related to feelings of having obligations to do too much writing or too heavy a research load.

As to whether members of the faculty felt that the demands of research interfered with their teaching, the following question and the responses indicated are pertinent.

Do the demands of your research interfere with your teaching?

	Yes
Frequently	4%
Occasionally	22%
Rarely	34%
Never	30%
No response	10%

Additional pertinent information may be available from the responses to a question requesting the faculty member to show the approximate average distribution of his energies, as percentages of his total time, between 1) undergraduate classroom teaching, 2) graduate classroom teaching, 3) other undergraduate teaching, 4) other graduate teaching, 5) advising, 6) research and scholarship, 7) University service, and 8) external service. The faculty member was also asked to indicate what percentage of his time he would *like* to devote to each of these activities. The responses to these questions will indicate the degree to which the faculty would like to increase or decrease the proportion of its time spent in these various ways. For this subcommittee, the alternatives of most interest are obviously those referring to research and scholarship, and to various kinds of teaching.

A questionnaire for doctoral students. A questionnaire has been distributed to a sample of graduate students at Stanford during the present academic year by the Center for Research and Development in Higher Education at the University of California, Berkeley. That questionnaire may have some bearing on the subcommittee's interests. It could yield correlations between 1) graduate students' ratings of the faculty on such dimensions as "accessibility," "interest in students," "interest in your research," on the one hand, and 2) graduate students' agreement with the statements that "the Department's emphasis is on pure research" and "the Department provides or demands adequate preparation for the discipline of research."

Questionnaires for undergraduates. As for questionnaires to be answered by undergraduates, no specimen was available to the subcommittee. A copy of a questionnaire given to graduating seniors at Stanford in 1955 was available, along with tabulations of the responses to that questionnaire; it did not contain questions directly relevant to the concerns of this subcommittee. A questionnaire study of the Stanford Class of 1968 is being planned, and it may contain questions bearing on faculty research and teaching.

Investigations Conducted Elsewhere

Relationships between teaching effectiveness and research awards at Tufts University. Jack B. Bresler, in a paper entitled "Teaching Effectiveness and Government Awards,"[11] compared the mean ratings by Tufts University students of the faculty's teacher effectiveness and the faculty's record of current and past government awards for research. Each faculty member was placed in one of three groups according to whether he had received 1) external support from the government or a foundation, 2) merely a faculty award, or 3) no support for research. In general, the mean ratings for teacher effectiveness were highest for members of the faculty in Group 1, next highest for Group 2, and lowest for Group 3. These trends appeared in the senior faculty in science and engineering, the junior faculty in science and engineering, the senior faculty in social science, the junior faculty in social science, the senior faculty in arts and humanities, and the junior faculty in arts and humanities. The same trends were found for number of publications in relation to the variable of support for research. Further, "students generally gave high ratings to those senior science and engineering faculty members receiving external support who (i) taught freshman courses, (ii) had honors such as membership in the American Academy of Arts and Sciences, or (iii) received unusually large amounts of support from the government." Bresler concluded ". . .the Tufts University data indicate that the individuals who have sought and received government funds function exceptionally well as teachers, in the opinion of their students."

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[11] *Science*, April 12, 1968, Vol. 60, pp. 164–167.

Relationships between research and teaching effectiveness at the University of Washington. A similar investigation was made at the University of Washington in the 1950s by Virginia Voeks[12]. She found no significant differences between members of the faculty in mean ratings by their students for teacher effectiveness, when members of the faculty within the same department were classified according to whether they were members of the university's research society or non-members, with academic rank held constant. Similarly, there were no relationships between number of publications and teaching effectiveness, with academic rank held constant and with department held constant. Accordingly, Voeks concluded that: "*When teaching and research are done simultaneously, is teaching usually impaired or enhanced?* The answer apparently is, neither." Similarly, "*Is total number of publications related to teacher-effectiveness?* Again, the answer is no." Similarly, "*Do people at the extremes of publication continuum differ from each other in quality of teaching?* . . . In none of those comparions did professors with many publications to their credit differ appreciably from those who had few in their teacher-ratings." This finding held true when comparisons were made separately in various academic areas–social sciences, natural sciences, and letters. "No trace of any relationship was found between amount of publishing and quality of teaching in any field."

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[12] "Publications and Teaching Effectiveness," *Journal of Higher Education.*

These two studies indicate that there is no negative correlation between research productivity and teaching effectiveness. Bresler's study indicated that a positive relationship was true at Tufts, while Voeks's study indicated absence of relationship. (Neither study bears on the possibility that the teaching of active and productive research workers might have been even better if they had not been distracted from their teaching by their research efforts.)

The Problem of Improving Teaching

In a sense, however, the foregoing approach to the problem of improving teaching seems pointless at Stanford. There is little likelihood that Stanford's great emphasis on research will be reduced for the sake of improving teaching. No one has yet argued seriously that this approach to the improvement of teaching at Stanford should be taken. Rather, the problem should be viewed as one of finding ways to improve teaching without any reduction in the amount and quality of the effort that Stanford's faculty devotes to research.

What are such ways? One approach is to introduce a countervailing force in favor of devotion to teaching. Such a force will raise teaching, in the eyes of the faculty, to the level of research as an avenue to the rewards that the University has to offer.

Actual and ideal practice in weighting teaching. It is usually held that classroom teaching should rank very high in importance among various factors in evaluating faculty for promotion, salary, or tenure. This is the judgment of the Humanities and Sciences faculty as reported above. It is also indicated by deans in colleges and universities throughout the nation who were asked to check various items as a major factor in such evaluation.[13]

On the other hand, Gustad found that research varies greatly according to type of institution, in its rank among the factors reported by deans as considered in evaluating faculty members. In liberal arts colleges, it ranked eighth; in teachers colleges, tenth; and in state colleges, it ranked 8.5 out of 14 factors considered. But in private universities, like Stanford, "research" ranked third, being exceeded in importance only by "classroom teaching" and by "other" factors. The point is that, even in universities like Stanford where research receives extremely high emphasis in the evaluation of faculty members, classroom teaching tends to receive even greater emphasis, as reported by the deans who make the evaluations.

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[13] These findings were reported by John W. Gustad, "Policies and Practices in Faculty Evaluation," *Educational Record*, 1961, 42, p. 199.

Nonetheless, the evaluation of classroom teaching and the weight assigned in practice to teaching are universally recognized as inadequate. In private universities, according to the reports of deans, the most frequently used source of evaluative data is "chairman evaluation," and the second most frequently used is "student opinions," by which is meant informal testimony of students collected on a chance basis. Systematic student ratings are used much less frequently (Gustad, op. cit.).

Students' ratings of teaching. Systematic student ratings of college teaching effectiveness have been studied for at least 40 years. There is a sizable literature on the reliability, validity, and usefulness of such ratings. By and large, such ratings emerge as the single most valid source of information concerning the effectiveness of teachers, in various studies at the elementary, secondary, and collegiate levels. Mean ratings of teachers by their students have been found to correlate significantly, and positively, even if only modestly, with the achievement of the students, when student ability is held constant.

Many of the criticisms leveled against students' ratings have been found empirically to be unwarranted. The following excerpt from a summary of research by Remmers[14] is typical of what has been reported by other investigators:

> Since about 1927, a considerable body of research has been done on the Purdue Rating Scale for Instructors and its revison, the Purdue Rating Scale for Instruction. This research has demonstrated that student evaluation is a useful, convenient, reliable, and valid means of self-supervison and self-improvement for the teacher. Major generalizations from these researches follow:
>
> 1. Reliability of ratings of teachers by students is a function of the number of raters, in accordance with the Spearman-Brown prophecy formula (Shock, Kelly, & Remmers, 1927). If 25 or more student ratings are averaged, they are as reliable as the better educational and mental tests at present available (Remmers, 1960).

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[14] H. H. Remmers, "Rating Methods in Research on Teaching." In N. L. Gage (Ed.), *Handbook of Research on Teaching*. Chicago: Rand McNally, 1963. Pp. 329–378.

2. Grades of students have little if any relationship to their ratings of instructors who assigned the grades (Elliott, 1950; Remmers, 1928, 1930).

3. Alumni 10 years after graduation agree very closely (rank order *rho* = 92) with on-campus students on the relative importance of 10 teacher characteristics (Drucker & Remmers, 1950).

4. Alumni 10 years after graduation agree substantially (*rs* ranging from .40 to .68) with on-campus students in their average ratings of the same instructors (Drucker & Remmers, 1950).

5. Halo effect, if present in ratings by such instruments as the Purdue Rating Scale for Instruction, is insufficient to raise the intertrait correlations to unity when corrected for unreliability of the ratings. Evidence indicates that students discriminate reliably among different aspects of the teacher's personality and of the course (Remmers, 1934).

6. Little if any relationship exists between students' ratings of the teacher and the difficulty of the course (Remmers, 1928).

7. In a given college or university, wide and important departmental differences in teaching effectiveness may exist as judged by student opinion (Remmers, 1928).

8. The sex of student raters bears little or no relationship to their ratings of teachers (Remmers, 1929).

9. The cost in time and money of obtaining student ratings of teachers is low. In fact, it is considerably lower than the cost of administering a typical standardized educational test of some comprehensiveness (Remmers, 1960).

10. Popularity in extraclass activities of the teacher is probably not appreciably related to student ratings of that teacher (Remmers, 1928, 1960).

11. Teachers with less than five years' experience tend to be rated lower than teachers with more than eight years' experience (Remmers, 1929).

12. The sex of the teacher is in general unrelated to the ratings received (Remmers, 1929).

13. There is a low but significant positive relationship ($r = 20$) between the mean objectively measured achievement of an instructor's students (with scholastic ability held constant) and students' ratings of college chemistry teachers (Elliott, 1950).

14. Students are more favorable than instructors to student ratings of instructors, but more instructors than students have noticed improvement in their teaching as a result of student ratings (Remmers, 1960).

Many colleges and universities have used such student ratings. Stecklein (1960), in his review of this topic, cited evidence that

> 40 percent of 804 colleges and universities in the United States have used students' ratings of teachers.

Kent[15] has more recently provided an excellent review of practice, experience, and research with students' evaluation of teaching and has arrived at similarly favorable conclusions.

Should Stanford give more serious consideration to the use of systematic ratings by students in the evaluation of teaching effectiveness? Such student ratings would provide an obvious kind of pressure for the improvement of teaching. Such pressure might help the faculty resist any pressure it may feel to neglect teaching in favor of research.

But one major question is that of faculty attitudes toward the evaluation of teaching by means of systematic student ratings. Does the faculty, or the University, want to have such a countervailing force operating for the improvement of teaching? As Dewey B. Stuit put it, "Most, if not all colleges and universities, state that quality of teaching is one factor considered in recommending appointments and promotions and also in awarding merit increases. Despite this fact, most college faculty members and administrators are content to rely on second-hand and fragmentary reports concerning quality of teaching. Why does this situation prevail? If the reasons for this attitude could be discovered, our progress would be more rapid in evaluating the quality of instruction".[16]

Is it enough to exert merely pressure to improve teaching, by means of systematic student ratings, which would occasionally be used administratively for the evaluation of faculty? Many members of the faculty already want to teach better and realize that there is room for improvement in their teaching. Yet they do not know how to proceed toward making the improvement. Such improvement lies beyond the question of evaluation, of pressure to improve, of providing forces opposed to the present almost unopposed pressure for research. Such improvement entails providing training programs that will assist the faculty in the improvement of its teaching. But the desirability, feasibility, and nature of such programs lie outside the scope of the present report.

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[15] "Student Evaluation of Teaching," *Educational Record*, Summer 1966, 47, 3, 376–406.

[16] *The Appraisal of Teaching in Large Universities*. Ann Arbor: Department of Psychology, University of Michigan, 1959, p. 51. *After Evaluation of Teaching, What?*

3

Recommendations

The Subcommittee on Research and Teaching recommends that the Committee on Research

1. Support the adoption on a University-wide basis of the kind of program of student rating of teaching now in use in the School of Engineering.

2. Encourage consideration by the Study of Education at Stanford of programs for assisting interested faculty members in the improvement of their teaching.

Appendix 1 Interview Survey of Faculty Activities and Attitudes

The following pages summarize the results of interviews with a random sample of the Stanford faculty (excluding the School of Medicine), conducted during winter quarter 1968 by four emeritus professors: Paul Farnsworth, Harold Fisher, Anthony Sokol, and Harry Williams. Each interviewer selected 30 subjects. 115 interviews were completed, distributed as follows:

Humanities and Sciences	77
Engineering	20
Law	5
Education	6
Business	7

There were no apparent differences among the results obtained by the various interviewers, but this is based on a general impression rather than any statistical test; some bias was obviously introduced since interviewers selected their own subjects and tended to pick people in fields related to their own.

Responses are generally reported as percents, rounded to whole numbers, by school. The number of subjects in Law, Education, and Business is small, and hence the percentage figures for these schools may not be reliable (as indicated by the parentheses). Medicine was omitted from the study due to the special character of its work.

I. Faculty Activities and Pressures

1. *Do you have this sense that you can never quite get caught up?*

	H&S	*Engineering*	*Law*	*Education*	*Business*	*Total*
Yes	85%	100%	(80%)	(100%)	(86%)	90%
No	12%	–	(20%)	–	(14%)	9%
NA	3%	–	–	–	–	1%

2. *What particular pressures and problems do you face in your work?*

A. *Obligations or commitments to do too much writing?*

	H&S	*Engineering*	*Law*	*Education*	*Business*	*Total*
Yes	38%	60%	–	(80%)	(56%)	43%
No	62%	35%	(100%)	(20%)	(44%)	56%
NA	–	5%	–	–	–	1%

14% of those who responded "Yes" added that this was by choice.

B. *Too heavy a teaching load?*

	H&S	*Engineering*	*Law*	*Education*	*Business*	*Total*
Yes	23%	15%	(20%)	(40%)	(44%)	20%
No	77%	85%	(80%)	(60%)	(56%)	80%

C. *Excessive obligations within your profession?*

	H&S	*Engineering*	*Law*	*Education*	*Business*	*Total*
Yes	32%	45%	(20%)	(40%)	(44%)	35%
No	68%	55%	(80%)	(60%)	(56%)	65%

D. *University Service such as administrative or committee work?*

	H&S	*Engineering*	*Law*	*Education*	*Business*	*Total*
Yes	31%	35%	(40%)	(20%)	–	30%
No	69%	65%	(60%)	(60%)	(86%)	61%
NA	–	–	–	(20%)	(14%)	9%

E. *Too heavy a research load?*

	H&S	*Engineering*	*Law*	*Education*	*Business*	*Total*
Yes	41%	25%	–	(60%)	–	35%
No	57%	75%	(60%)	(40%)	(86%)	61%
NA	2%	–	(40%)	–	(14%)	4%

35% of those who responded "Yes" added that this was by choice.

F. *Excessive student demands on your time?*

	H&S	*Engineering*	*Law*	*Education*	*Business*	*Total*
Yes	22%	50%	–	(40%)	(14%)	26%
"Heavy, not excessive"	8%	15%	(20%)	–	–	9%
No	70%	30%	(80%)	(60%)	(86%)	64%
NA	–	5%	–	–	–	1%

G. *Insufficient clerical help?*

	H&S	*Engineering*	*Law*	*Education*	*Business*	*Total*
Yes	36%	45%	(20%)	–	(14%)	34%
No	64%	45%	(80%)	(100%)	(86%)	64%
NA	–	10%	–	–	–	2%

Additional questions about clerical help revealed that approximately 40 percent of the H&S faculty can now count on 10 hours or less of clerical help per week; in a separate question, 25 percent find this amount of help adequate. The discrepancy between real and ideal is less at the upper end of the scale; 19 percent of the H&S faculty now have one full time clerical assistant, and 25 percent report they could effectively use this much help.

Asked if they could effectively use more research assistance from graduate students, the affirmative responses were distributed as follows: H&S-68 percent; Engineering-20 percent; Law-80 percent; Education-67 percent; Business-80 percent. Asked about similar help from undergraduates, 62 percent of H&S and 56 percent of Engineering faculty responded that they could use it.

Satisfaction with office space is relatively low in H&S: 65 percent report they are satisfied, compared with 80- 86 percent in the other schools.

3. Faculty members were also asked if the demands of their research interfere with their teaching, with these results:

	H&S	*Engineering*	*Law*	*Education*	*Business*	*Total*
Frequently	4%	5%	–	–	–	4%
Occasionally	23%	15%	–	(40%)	(29%)	22%
Rarely	26%	55%	(40%)	(40%)	(57%)	34%
Never	38%	15%	(40%)	(20%)	–	30%
NA	10%	10%	(20%)	–	(14%)	10%

4. They were then requested to fill out a table, which showed the approximate *average* distribution of their energies as percentages of their total working time. Below the *median* percentages are given.

Estimated Time Distribution	*H&S*	*Engineering*	*Law*	*Education*	*Business*	*Total*
Undergraduate classroom teaching	17%	5%	–	–	–	14%
Graduate classroom teaching	20%	25%	(35%)	(20%)	(27%)	22%
Other undergraduate teaching	1%	–	–	–	–	–
Other graduate teaching	11%	21%	–	–	(9%)	12%
Advising	6%	5%	(6%)	(15%)	(4%)	7%
Research and scholarship	28%	29%	(28%)	(35%)	(34%)	29%
University service	10%	8%	(14%)	(13%)	(10%)	9%
External service	6%	6%	(12%)	(17%)	(12%)	7%

II. Advising

Turning to specific faculty activities, the respondents were asked:

5. *Are you currently advising students?*

	H&S	*Engineering*	*Law*	*Education*	*Business*	*Total*
Yes	78%	90%	(100%)	(100%)	(29%)	80%
No	17%	5%	–	–	(70%)	17%
NA	5%	5%	–	–	–	3%

How many undergraduate non-majors do you advise?

		H&S	*Engineering*
Freshmen:	0	74%	75%
	1–9	3%	–
	10–19	4%	15%
	NA	19%	10%
Sophomores:	0	71%	85%
	1–9	8%	–
	10–19	1%	5%
	20+	1%	–
	NA	19%	10%

How many undergraduate majors?

	H&S	*Engineering*
0	35%	70%
1–9	13%	15%
10–19	10%	15%
20–29	13%	–
30–39	7%	–
40+	6%	–
NA	6%	–

How many graduate students do you advise (excluding dissertation students)?

	H&S	*Engineering*	*Law*	*Education*	*Business*	*Total*
0	18%	–	–	–	–	12%
1–9	41%	35%	(40%)	(17%)	(29%)	37%
10–19	17%	45%	(20%)	(33%)	–	22%
20–29	3%	10%	(20%)	(17%)	–	5%
30+	4%	–	(20%)	(17%)	–	4%
NA	17%	10%	–	(17%)	(71%)	20%

6. *How much satisfaction do you derive from advising?*

	H&S	*Engineering*	*Law*	*Education*	*Business*	*Total*
Considerable	52%	50%	(20%)	(67%)	(29%)	50%
Some	12%	25%	–	–	(44%)	15%
Little or none	8%	10%	(60%)	–	–	10%
From content, not formalities	10%	5%	–	–	–	7%
Graduates, not undergraduates	7%	–	–	–	–	5%
NA	11%	10%	(20%)	(33%)	(27%)	12%

III. Teaching

7. *Do you prefer to teach graduate students or undergraduate students?*

	H&S	*Engineering*	*Law*	*Education*	*Business*	*Total*
Undergraduates	8%	5%	–	(16%)	–	7%
Graduates	23%	50%	(20%)	(67%)	(44%)	32%
Both/no preference	58%	25%	(20%)	–	–	45%
NA	10%	20%	(60%)	(17%)	(56%)	16%

8. *If you are not now teaching undergraduates because of your departmental or school affiliation, would you like to?*

	H&S	*Engineering*	*Law*	*Education*	*Business*	*Total*
Yes	17%	45%	–	(67%)	(44%)	25%
Perhaps	1%	–	(20%)	–	–	2%
No	9%	15%	–	(17%)	(29%)	11%
NA	73%	40%	(80%)	(16%)	(27%)	52%

9. *Assuming that courses can be characterized as* cultural *designed for the student community in general),* service *(designed for specific curricula, frequently in other departments), and* professional *(designed for further specialization, including graduate work in your department), how would you rank them in order of your preference as far as your participation is concerned?*
(The figures given are numbers, not percentages.)

	H&S	*Engineering*	*Law*	*Education*	*Business*	*Total*
Cultural most important	10	1	1	–	–	12
Service most important	1	1	1	–	–	3
Professional most important	51	18	3	7	4	83
Cultural second	34	10	2	4	2	52
Service second	22	10	–	1	2	35
Professional second	6	1	1	–	–	8
Cultural third	16	12	–	3	3	34
Service third	38	9	3	1	1	52
Professional third	5	–	–	–	–	5

IV. Academic Calendar and Examination

When asked how satisfactory they find the present quarter calendar for the courses they teach, the satisfied response was as follows: H&S-75 percent; Engineering-50 percent; Education-80 percent; Business-100 percent (Law is on a semester system). Asked what would be the optimal length, the following percentages favored the 16-week semester: H&S-45 percent; Engineering-14 percent; Law-60 percent; Education-20 percent; Business-25 percent.

To the question, "How would you feel about a 'free period' between academic sessions during which there would be no formal classes or assignments?", the favorable response was: H&S-37 percent; Engineering-14 percent; Law-40 percent; Education-100 percent; Business-80 percent.

Favoring a reading period of two weeks or more at the end of each academic term: H&S-28 percent; Engineering-7 percent; Law-100 percent; Education-40 percent; Business-0 percent.

10. *Do you think Stanford should make more use of proficiency (or advanced placement) examinations as alternatives to formal courses in introductory and "skill" courses?*

	H&S	*Engineering*	*Law*	*Education*	*Business*	*Total*
Yes	52%	75%	(20%)	(100%)	(70%)	58%
No	26%	5%	–	–	–	18%
Partially	10%	5%	–	–	–	8%
NA	12%	15%	(80%)	–	(30%)	16%

11. *Should we make greater use of comprehensive examinations?*

A. *As full or partial replacement for major course requirements?*

	H&S	*Engineering*	*Law*	*Education*	*Business*	*Total*
Yes	43%	60%	(80%)	(60%)	(14%)	46%
Yes, partial	16%	–	–	–	(14%)	12%
No	35%	25%	–	–	(56%)	32%
NA	6%	15%	(20%)	(40%)	(16%)	10%

B. *As culminations to extensive sequences of independent work?*

	H&S	*Engineering*	*Law*	*Education*	*Business*	*Total*
Yes	57%	45%	(20%)	(60%)	(29%)	47%
Perhaps	26%	20%	(20%)	(20%)	(56%)	27%
No	10%	10%	–	(20%)	–	10%
NA	7%	25%	(60%)	–	(15%)	16%

C. *As an alternate method for receiving credit for a course?*

	H&S	*Engineering*	*Law*	*Education*	*Business*	*Total*
Yes	45%	50%	(40%)	(80%)	(14%)	45%
Perhaps	12%	10%	–	–	–	10%
No	36%	25%	(60%)	–	(56%)	35%
NA	7%	15%	–	(20%)	(30%)	10%

Appendix 2 Pilot Project in Student Evaluation of Teaching & Courses

In spring quarter 1968, the staff of the Study of Education at Stanford conducted a pilot project in the systematic collection of student opinions about their instructors and courses. Unlike the student *Course Review*, which exists largely for the benefit of students, the SES project was designed to be a service for faculty members. Instructors participated voluntarily, and the results of the questionnaire surveys were made available to participants only, to do with as they wished. The project had two goals: 1) to assess faculty interest in such a service, and 2) to determine the feasibility of using optical scanning equipment to score the questionnaire returns.

Two samples of faculty members drawn for previous SES research were combined, and the resulting group of 283 faculty members was invited to participate in the project. Ninety-eight instructors, or approximately 35 percent, agreed to participate, including 22 instructors of Western Civilization and 37 instructors of freshman English. Prior to the last week of classes, participants received questionnaires to distribute in the courses for which evaluation was requested. The completed questionnaires were returned to SES, which forwarded them to the Digitek Optical Scanning Corporation for scoring. A programmer from the University office of Administrative Data Processing assisted in the scoring, in producing a magnetic tape record of the questionnaire responses, and in producing summary reports for each participant.

The questionnaire that was used was a collection of items drawn from other questionnaires at use within Stanford and at other institutions, plus items suggested by interested faculty members and students. The first 12 questions, relating to characteristics of the instructor, were taken without modification from a questionnaire developed at the University of Washington, where student evaluations have been collected systematically since about 1924. Tau Beta Phi, the Stanford honor fraternity in Engineering, also uses the University of Washington questions in the annual surveys that they conduct in engineering courses. The second set of questions was directed toward characteristics of the course, including the pace of presentation of material, the value of texts and reading assignments, and the amount of required work.

Although a formal survey of participants' reactions to the project was not made, numerous faculty members expressed satisfaction with the summary reports they received. There were several deficiencies in the procedure used for distributing the forms, and the identification section of the form itself was not sufficiently clear, resulting in a high volume of errors, which had to be manually corrected before the forms went into the optical scanning equipment.

The staff members conducting the project reviewed the procedural errors and, deciding that they could be remedied easily, recommended that the evaluation service be offered again and expanded to include all instructors in a given quarter. Besides minor procedural changes, the staff also recommended some modifications in the questionnaire, and a switch to the optical scanning equipment of National Computer Systems for reading the questionnaires and producing summary reports for each instructor. NCS would also produce a magnetic tape to Stanford specifications, which would allow later detailed statistical analysis of individual questionnaire items. Of particular importance is an analysis of the set of questions drawn from the University of Washington form. It is not known whether the University of Washington findings relating to item validity and reliability and the intercorrelations between items are at all transferable to another campus population.

Since the SES recommendation concerning an Academic Planning Office has not yet been implemented, staff members in the Office of the Provost have agreed to administer the evaluation program during spring quarter 1969. All active instructors will be invited to take part, and again the results of the surveys will be confidential. Although a full set of summary reports will be retained by the supervising staff, the data will be used only for the purpose of questionnaire analysis.

Clearly, this procedure focuses on providing useful information for instructors who wish to improve their teaching. There are alternative or further uses to which the student opinion data could be put; for example, the information could be made partially or wholly available to the student *Course Review*, thus avoiding duplication of effort between the two programs. In April 1969, Provost Lyman established a joint committee of faculty, students, and administrators to investigate the role of student evaluations of teaching and courses. Although meetings will not begin until fall, it is expected that the committee will closely scrutinize the successes and failures of the expanded program to be run in the spring by the Provost's Office, and will recommend modifications–perhaps drastic–to be implemented during the 1969–70 academic year.

Sally Main
Assistant to the Provost

April 15, 1969

Appendix 4 Proposal for Institute of Urban Studies

It is recommended that the Committee on University Research Policy have as a first priority on its agenda the establishment of an Institute of Urban Studies at Stanford: The institute would cut across departmental lines and school lines, but would be largely staffed and operated by members of various departments. We are aware that such an institute would operate in a manner somewhat contrary to the more individualistic approach typical of most of the research efforts in the University. However, what is being proposed is not something that is intended to coerce any individual faculty members to change their own way of life in any drastic fashion. The principal reason for urging formation of an institute involving, as it will, a major effort by the University to raise funds, make additional appointments in various departments, appoint permanent research staff, etc., is the urgency of the problems on which this institute would work.

It is relevant to point out that there was a previous recommendation by a faculty committee to set up such an organization. This proposal was made about a year ago and was not acted upon due to lack of University funds. It is obvious that the proposal is still relevant and the situation, if anything, is more urgent. There is a need to bring the major intellectual resources of the country to bear on the solution of these problems. The University has such resources, provides an environment for adding additional resources, and should be among the national institutions heavily involved. An equally important reason for such a move is that it would meet the demands of the student body for meaningful vocational and social objectives. Whatever distortion such a program may cause in normal University procedures and methods of operation would be minimal, and the objectives are such as to warrant these minor distortions.

For the University to abdicate responsibility for this area of research is to withdraw in the face of the most serious problem our society has. The program that is being urged is not one in which the University would actually operate rehabilitation projects of one kind or another, either educational or otherwise, but rather, a research activity on a large scale to understand how to do these various things. If the program does require initiating large experimental programs to evaluate techniques for education, job training, family reconstruction, etc., this may be necessary. It may involve larger scale effort than the University is normally accustomed to, but such programs will have to be undertaken by someone, and for problems of this breadth and complexity, overlapping so many disciplines, the University seems to be an ideal institution to provide sufficient diversity and quality of talent.

Specifically, then, it is proposed that Stanford should inaugurate a large-scale, interdepartmental institute whose function would be to obtain large-scale funding, either from foundations or the government, for comprehensive investigations of the various problems concerned with the rehabilitation of urban society, including particularly the problem of minority groups. The institute should cover educational, architectural, anthropological, economic, political science, sociological, and psychological studies. The money so raised should be used to encourage the various departments to make additional appointments where necessary to work in these fields, to provide research funds for existing members of the various relevant departments, to hire long-term research staff, and to do all the other things necessary to make this a meaningful endeavor.

The reasons for this, to repeat, are:

1. The university should be socially useful.

2. The subject presents challenging problems to a number of university disciplines.

3. The educational value to the program. The proposed program would affect the distribution of formal courses and would provide challenging and significant research opportunities for students. Independent of transient perturbations producing present student opinions, the student body will continue to look for educational programs and vocational opportunities that they feel are significant and that provide them with meaningful goals. There is nothing better designed to meet this need of the student body than what is proposed here.

4. There are already indications on the part of other universities including Harvard, MIT, and probably some others, to undertake activities of this kind. If Stanford does not get involved, aside from more altruistic motives, it will fall behind in the breadth and importance of its program relative to these other major universities.

As to the specifics of the organization of such an institute, we have taken the liberty to quote below a number of recommendations made by the previous committee, which looked at this problem and made specific proposals as to methods of organization. We have quoted here only some of these recommendations, which we feel to be relevant as guide lines for any such proposed institute. Those that we did not quote were largely concerned with the details of setting up an institute that may no longer be relevant, or were not necessarily a unique approach to the problem.

It would seem to us that in devising the structure of such an institute and for the optimum strategy, a committee representing at least the Departments of Economics, Sociology, Psychology, Political Science, Anthropology, School of Education, School of Business, Engineering Economic Systems, one or two other departments in the School of Engineering, and possibly the Law and Medical Schools, should be represented and possibly partake in the final program.

It is also relevant to point out that in a rather cursory survey of the faculty by the previous committee, (a questionnaire sent to about 50 members of the faculty) about one-third expressed a positive interest in conducting urban-oriented research through such an institute, one-third expressed no interest, and one-third had not replied after a period of two weeks.

Excerpts from:

Report of
Provost's Committee on Metropolitan Studies
April 13, 1967

1. The area of metropolitan studies is of sufficient intellectual challenge as well as social significance to warrant at least an exploratory commitment of resources by the University. Further, it appears that fruitful development of this field is unlikely to take place if the initiative rests entirely with individual faculty members working within their respective fields and seeking financial support from a base within their respective schools or departments.

3. It seems likely that substantial resources, both governmental and private, will become available to support work in the metropolitan studies field. It also seems likely that Stanford's capacity to attract such support would be enhanced by the creation of an administrative structure to support and coordinate the work of individuals and groups interested in the field. Such a structure should, of course, not be pre-emptive of work in the metropolitan studies field. To the extent that individual faculty members prefer to seek support for such studies on their own they should remain free to do so. What is required is a facility, not a bottleneck.

4. It is essential that the individuals involved be regular members of the Stanford faculty having a secure base in an existing school or department and that the work carried on in metropolitan studies be work that they, as members of this academic community, wish to engage in, either individually or in voluntary association with colleagues.

8. Policy supervision of the Center and of its Director should be in the hands of a multi-disciplinary Executive Committee appointed by the President or the Provost. However, the Director must be given considerable latitude if the right man is to be attracted.

9. The charter of the proposed Center, which should be developed in detail by the proposed Executive Committee, should contain the following restrictive provision, designed to insure that the Center is a facility for the Stanford faculty and not an autonomous research organization:

(a) no project should be sponsored by the Center unless it is actively directed by a member of the Stanford faculty;

(b) research personnel should preferably be Stanford faculty or students and the duration of their employment should be conditioned to the extent feasible on their continuing in that status;

(c) research personnel other than Stanford faculty or students should be hired only for the duration of a particular project and with the concurrence of the Executive Committee.

Marvin Chodorow
Professor
Electrical Engineering

Appendix 5 Proposal for a Center in Environmental Studies

The Challenge

The population explosion and technology in the hands of man are subjecting this earth to a tremendous process of degradation. And with the world's population doubling every 37 years and technological capability spreading, the situation seems destined to deteriorate a good deal further before it can be improved. Each day brings with it further erosion of the diversity and stability of the world around us, and further human intrusion and disturbance of the environmental system upon which we are dependent for our physical survival and for the fulfillment of our spiritual and esthetic needs. We are, through ignorance and lack of consideration for the long-term consequences of our behavior, inundating the landscape, abusing the land, polluting the air and water, poisoning other forms of life as well as ourselves, displacing, threatening, and exterminating the larger animals, exhausting nonrenewable resources, and generally moving toward an at once befouled and sterile environment in which we are surrounded solely by constructs of our own making. Of course we will never get there.

Our almost total lack of respect for the value of natural environmental processes can result in our overwhelming the system, with the consequent degradation of our host, the earth, and the degeneration and decay of *homo sapiens* and other macroscopic life forms.

The Response

It would seem that Stanford has the clear responsibility to ask if there is anything it can do that it is not now doing in the line of education and research in the environmental arena. Is there anything it is not doing that it could do to spark response from the faculty and students, to have broad impact throughout the country and throughout the world? Is there anything it could do to excite alumni, to contribute to the resolution of this greatest threat that the world now faces, to make a difference in our chances for survival and–granting survival–to contribute to the prospects for future lives of quality in a rich, varied, and uncrowded environment?

We would answer to all these, "Yes." We have an image of a great university as a place that is above all else a center for deep thought on fundamental issues. What could be of more fundamental concern than the preservation of the environmental system of the earth? It seems that we are spending a vastly disproportionate amount of effort in our universities on the means of exploiting the earth in what appears to be the extremely short-term interest of man. Surely the university has a role to play in the stimulation of greater humility and the encouragement of restraint and responsibility commensurate with the power of man to alter the environment. It seems that there is a need for a wedding of science and humanities into a team effort devoted to trying to identify the proper place of man on this planet, the extent to which he should influence the natural environment, and the characteristics that should be satisfied by the artificial system that man develops about him if he is to be assured of a physically and spiritually healthful relationship to the natural environment of the earth, to other creatures, and to his fellow man. We should seek to identify those environmental options that we must preserve today to guarantee the human race increased stability and the freedom to enjoy the widest possible spectrum of future opportunities.

Probably one of the most constructive things we could do is to busily occupy ourselves deciding what we shouldn't do to the natural environmental system, while simultaneously promoting the holding action concept of not disturbing those aspects of the environmental system we don't understand.

We have much to learn from one another, and the quality of Stanford's contribution toward the understanding and resolution of environmental issues will depend on the breadth of the inter- or multi-disciplinary character of the response that can be stimulated. We believe that there is a need to commence to weave into the whole fabric of the University a heightened degree of concern and involvement with environmental issues. There are a variety of responses that we can and are attempting jointly and as individuals. But there is a need for an organizational and physical structure to provide support and focus and to ensure momentum to the effort.

Center for Environmental Studies

We would suggest that consideration be given to the development of the following concept involving the creation of a Center for Environmental Studies.

Purpose

1. To encourage and stimulate ambitious, deep, and innovative thought, teaching, and research, on any of the wide range of environmental issues.
2. To strive to stimulate understanding and respect for the natural environmental system and the consideration of the manner in which man can best relate to that system.
3. To provide structural and physical focus and momentum for the widest and most flexible multi-disciplinary involvement possible, and to catalyze university-wide participation.
4. To seek to identify new problem areas.
5. To help with the provision of support for research and education in the environmental studies area.
6. To contribute to the development of a program providing all students with a general environmental perspective.

Features

1. Physical structure–offices, class and lecture rooms, library, documents center, etc.
2. Close interaction between Center personnel and individuals throughout the University with whom they would collaborate in teaching and research to the extent mutually desired.
3. Provision of assistance in attaining financial support–with perhaps discretionary funds available–for University environmental studies, teaching activities, undergraduate and graduate research, pilot study projects, experimental inter-disciplinary pursuits, and perhaps full-spectrum support.
4. Flexibility to move freely from one area to another.
5. Sponsor guest lectureships.
6. Have in residence one or more particularly qualified individuals invited for a year's visit to interact with Stanford's Environmental Studies Program.
7. Provide fellowships to members of communications media for special study and updating on environmental issues.
8. Development of programs of interaction with area grammar schools and high schools.
9. Development of programs of interaction with local government and elected officials.
10. Work having elements of relevancy to local environmental problems.

Additional Recommendation

It is recommended that consideration be given building up strength at Stanford in the following areas:

1. Urban studies (see Appendix 4)
2. Oceanography
3. Meteorology
4. Conservation
5. Geography

We have mentioned geography here as a relevant discipline in view of the marked change in emphasis in this field toward problems of environment and environmental control. We quote here some significant comments about this change from an article entitled "Colleges to Get New Geography," (*New York Times*, January 8, 1968).

The new geography is, according to the *Times* article, "analytical, theoretical, and mathematical. It is intimately involved with the development of urban, social, and economic planning programs [and] is concerned with how man uses terrestrial space. . ." New geographical research developments include, "methods for determining the systematic patterns in agricultural and urban land use. . .use of remote sensing devices, of the type equipping reconnaisance satellites. . .central place theory, an approach to the study of spatial distribution of towns and cities. . .development of mathematical techniques for prediction on the spread of birth control methods, and the movement of racial minority groups to white neighborhoods, and other widely varied events. . .[and] the development of mathematical techniques for the study of transportation systems."

The *Times* article mentioned that Edward B. Espenshade, Jr., chairman of Northwestern's Department of Geography is chairing the Commission on College Geography for the year 1967–1968. In reply to a letter to Espenshade inquiring into the activities of the Commission and about his opinion on the role of modern geography in an environmental studies program, he said, "Your interest is one that is very close to my own. Unfortunately it is an area that has been, in my opinion, neglected by geographers, although they pay lip service to it. Although the physical-biotic system is determined by natural and cultural processes [and is the subject of] a considerable number of elementary geography courses, research efforts in the field in this area have been limited. Thus the vitality provided by research in the curriculum is missing. . .There are few geography departments with [a focus on environmental studies] and if Stanford ever re-establishes a department this might be the sort of focus which would give it vitality as well as a position of leadership."

Stanford is uniquely endowed to make a contribution in environmental studies. It is located in one of the most livable places on earth, and one of the physically most threatened. There is a wealth of educational field trip and research material available in Peninsula and Bay Area environmental problems and issues. The SES program has demonstrated Stanford's interest in fresh ideas and constructive action. The University is small enough to favor efficient and effective multi-disciplinary activity.

Sidney Liebes, Jr.
Research Associate
Genetics

Appendix 6 Questions Considered for Inclusion in Questionnaires on Research & Teaching

For Students

1. As you observe members of the faculty at Stanford, do you get the impression that their research interferes with their teaching?

a. Yes, very much. . . e. The opposite seems to be true.

2. If my teachers at Stanford were not doing research, it is my impression that they would do

a. a much better job of teaching. . . d. a much worse job of teaching.

3. It is my impression that research contributes positively to teaching for

a. A majority of the faculty.
b. About half the faculty.
c. A minority of the faculty.

For Members of the Faculty

1. In my everyday work, my desire to do research interferes with my ability to prepare for my classes.

Never. . .Very often

2. My research leads into what I am teaching in such a way as to enrich the latter.

Never. . .Very often

3. If I were not doing research, I would be a better teacher.

Disagree strongly. . .Agree strongly

4. In my department, the quality of a man's teaching seems to be correlated with the quality of his research.

Very negatively. . .Very positively

5. In teaching for general cultural objectives, of the kind that are worthwhile for any educated person, which of the following is true of you?

a. I do not teach for these objectives.
b. In teaching for these objectives, my research work is irrelevant.
c. In teaching for these objectives, my research work interferes with my effectiveness.
d. In teaching for these objectives, my research work improves my effectiveness.

6. In education for technical competence, of the kind that is needed by workers in the various professions that are practiced outside of universities, which of the following is true?

(same alternatives as for preceding question)

7. In the education of future scholars and research workers in my field, which of the following is true?

(same alternatives as for preceding question)

8. The effect on my teaching of my having to cut and miss classes in order to attend off-campus meetings and conferences related to my research is

Desirable. . .Undesirable

9. The participation of undergraduates in genuine research work in my department is

a. Highly desirable and feasible.
b. Desirable but not feasible.
c. Neither desirable nor feasible.